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ABSTRACT

Each of the nine articles in this monograph demonstrates the use of a particular telecommunications technology, or a mixture of technologies and media at particular community colleges. Following an introduction by James Zigerell, the monograph presents (1) "Teleconferencing: The Homebound Project at Rio Salado College," by Helen Sprawls, which shows how a telephone in the home or hospital room can offer a direct line between instructor and student; (2) "Audiocassette: A Literature Course from the Bay Area Community College Television Consortium," by George A. Willey, which offers an example of the instructional potential of audio for both direct and supplemental instruction; (3) "Videocassette: Telecourses from the Northern Illinois Learning Resources Cooperative," by Ralph G. Steinke, which explains how a community college consortium offers courses on videocassette in campus learning centers and public libraries; (4) "Videodisc: A Report on Science Laboratory Simulations," by Peter J. Dirr and Victoria Murphey, which discusses a project using videodiscs to simulate science laboratory experiences; (5) "Slide/Tape Modules: Developing Learning Materials in the North Carolina Rural Renaissance Consortium," by Norman Petty, which reports on how a newspaper article was utilized to develop adult learning modules for distance learners; (6) "Educational Access Cable: The Telecommunications System at Kirkwood Community College," by Richard Gross, which describes a model system that combines relatively inexpensive technologies to serve both an urban district and a rural area; (7) "Television: A Computer Course by TVOntario Academy," by David Walker, which shows how broadcasters and educators can work together in extending education and training; (8) "Satellite: The Learning System in British Columbia," by Kathleen Forsythe and Valerie Collins, which demonstrates how a satellite learning system can overcome adult learners' lack of time and problems of distance without sacrificing instructional quality; and (9) "Multimedia: The College of the Air at Mercer County Community College," by George Schwartz, which describes a program employing both broadcast and non-broadcast media to bring educational opportunities to area residents. (RO)

TELELEARNING MODELS:

Expanding the Community College Community

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ISSUES SERIES NO. 3

AACJC

TELELEARNING MODELS:

Expanding the Community College Community

Nine case studies showing how colleges, alone or in partnerships, creatively utilize new delivery systems to reach a variety of student clienteles.

EDITED BY JAMES ZIGERELL

This publication was prepared
under the auspices of the
Instructional Telecommunications Consortium

AACJC ISSUES SERIES NO. 3

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CONTENTS

PREFACE *v*
by Dale Parnell

INTRODUCTION *vii*
by James Zigerell

TELECONFERENCING: The Homebound Project at Rio Salado College *1*
by Helen Sprawls

AUDIOCASSETTE: A Literature Course from the Bay Area Community College Television Consortium *7*
by George A. Willey

VIDEOCASSETTE: Telecourses from the Northern Illinois Learning Resources Cooperative *17*
by Ralph G. Steinke

VIDEODISC: A Report on Science Laboratory Simulations *23*
by Peter J. Dirr and Victoria Murphey

SLIDE/TAPE MODULES: Developing Learning Materials in the North Carolina Rural Renaissance Consortium *33*
by Norman Petty

EDUCATIONAL ACCESS CABLE: The Telecommunications System at Kirkwood Community College *41*
by Richard Gross

TELEVISION: A Computer Course by TVOntario Academy *51*
by David Walker

SATELLITE: The "Learning System" in British Columbia *61*
by Kathleen Forsythe and Valerie Collins

MULTIMEDIA: The College of the Air at Mercer County Community College *69*
by George Schwartz

PREFACE

by Dale Parnell

The nation's community, technical, and junior colleges have always been at the forefront in identifying and responding to unmet educational needs in the larger community. The advent of new technologies and new media provided many of these institutions with additional useful tools for serving their various student clienteles.

It therefore seemed appropriate for the American Association of Community and Junior Colleges, through its Instructional Telecommunications Consortium (ITC), to locate exemplary programs, commission articles describing those programs, and share this information with the larger membership. It is our hope that the resulting monograph will stimulate interest in the larger membership and encourage the further development of these kinds of programs.

James Zigerell, the ITC Executive Director and general editor, requested the authors to submit the case studies included herein and adapted them to meet editorial requirements. Kenneth E. Young, Senior Associate with Eisenberg Associates, assisted with the editing. Everyone associated with this monograph hopes that you find it to be a useful publication—and that means, more than anything else, that it stimulates you to think about how your institution can develop, expand, or improve its telecommunications programs.

Dale Parnell
President
AACJC

INTRODUCTION

by James Zigerell

Technology is advancing so rapidly that it is difficult to predict in what ways it will shape the media. Even now, however, it is clear that with careful planning, skillful execution, and thorough evaluation, telecommunications will play an increasingly fundamental role in the learning processes of Americans of all ages and backgrounds.

A Public Trust: The Report of the Carnegie Commission on the Future of Public Broadcasting, 1979

The blue ribbon panel that conducted the study quoted above was concerned primarily with relations between public broadcasters and educators, but its urging each public television station to "carve out for itself" an appropriate instructional role in its community carried meaning for educational institutions as well. The articles that follow demonstrate that many community colleges have taken this advice to heart.

Each of the nine articles in this monograph shows how a particular telecommunications technology, or a mixture of technologies and media, have enabled an institution or group of institutions to "carve out" a special instructional niche. Many of the technologies represented here are readily available to and affordable for almost any institution, no matter how modest its resources.

James Zigerell is Executive Director of the Instructional Telecommunications Consortium (ITC). He was formerly Assistant Vice Chancellor at the City Colleges of Chicago.

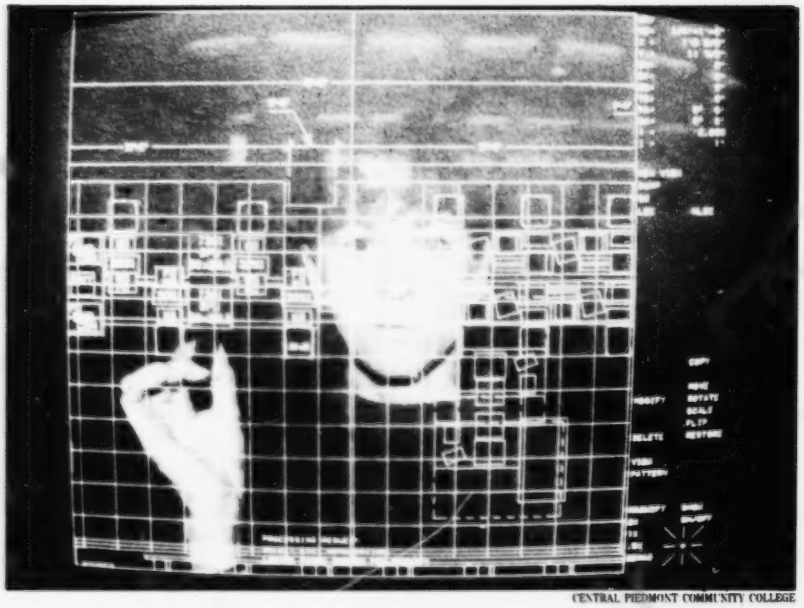
Most of the articles describe the use of "nonbroadcast technologies"—such as the telephone, cassettes (both audio and video), and narrowcast video transmission—that do not require large professional staffs or major expenditures of funds. Other articles, while reporting on the use of more complex or expensive delivery systems, demonstrate the effectiveness of institutional collaboration in bringing down costs as well as attracting external financial support. Together, the chapters demonstrate that an appropriate and affordable medium or media mix can be found to meet well-defined learning needs that cannot be met in conventional ways. The projects they describe will serve as models that might be emulated or adopted by other institutions.

Open broadcast television, of course, still appeals to educators as the most glamorous of the telecommunications technologies, presenting as it does an opportunity to reach large audiences. The Adult Learning Service (ALS) of the Public Broadcasting Service (PBS) is performing a commendable function by bringing college-credit telecourses to adult learners in their homes, as well as presenting intellectually stimulating television fare to general audiences. The Annenberg School of Communication/Corporation for Public Broadcasting (ASC/CPB) Project continues to add to its library of expensive television series. These programs are adaptable for use as college-credit courses when they are shown on PBS or leased for closed-circuit showings.

It is a fact of life, however, that partnerships between formal educators and public or commercial broadcasters are hard to maintain. It is true, as well, that open broadcast time, especially at hours when most people can watch, is a scarce commodity. Also, ALS is now developing a National Narrowcast Service (NNS), which will employ Instructional Television Fixed Service (ITFS) channels to transmit instructional programs to sites with special reception equipment. One wonders how many of the college-credit series now licensed to ALS will continue to be shown on open public broadcast once NNS is fully operational.

Fortunately, as the contributors to this publication prove, an imaginative educator who regards the broader community as his service area can find relatively inexpensive delivery systems that will meet the learning needs of both on- and off-campus students, based on accessibility, convenience, teacher control, interactive capability, and immediate availability.

Telecommunications technologies not only include laser beams and satellites but also the familiar telephone. In "*Teleconferencing*: The Homebound Project at Rio Salado Community College," Helen Sprawls describes how a telephone in the home or hospital room can offer a direct line between



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instructor and student and a new hope in life for the physically disabled and homebound.

In recent years, radio has been overshadowed by video as an instructional medium. Educators, however, are beginning to recognize, or rediscover, the instructional potential of audio for both direct and supplemental instruction. George A. Willey, in "*Audiocassette*: A Literature Course in the Bay Area Television Consortium," describes a successful example.

The videocassette player is fast finding its place in the American home, not only as a source of entertainment but also as a tool for independent learning. Along with the microcomputer, it is forming a home learning center. Ralph G. Steinke, in "*Videocassette*: Telecourses at the Northern Illinois Learning Resources Cooperative," explains how a consortium of community colleges offers courses on videocassette in campus learning centers, community public libraries, and the privacy of students' homes.

Because of its interactive and storage capabilities, the videodisc is regarded by many instructional designers as the most promising of the current technology-based educational and training tools. Peter J. Dirr and

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Victoria Murphey, in "*Videodisc*: A Report on Science Laboratory Simulations," discuss a project that investigated the effectiveness of videodiscs in simulating science laboratory experiences.

One day, a North Carolina educator happened upon an article in *The Wall Street Journal* that inspired him to help form an association of colleges to meet the special educational needs of rural residents in his state. In "*Slide/Tape Modules*: Developing Learning Materials in the North Carolina Rural Renaissance Consortium," Norman Petty reports on how that newspaper article was utilized to develop adult learning modules for distance learners.

In "*Educational Access Cable*: The Telecommunications System at Kirkwood Community College," Richard Gross describes a model that has attracted a stream of visitors from the United States and abroad. By combining relatively inexpensive technologies, the college has been able to serve both an urban district and a rural area, equalizing educational opportunity and overcoming problems of distance.

Our Canadian neighbors have provided valuable leadership in distance-learning, one of those leaders being the Ontario Education Authority and its TVOntario. In "*Television*: A Computer Course by TVOntario Academy," David Walker and colleagues show how broadcasters and educators can work together in extending education and training, using as a specific example—"Bits and Bytes," a course designed to introduce

learners to the use of the microcomputer.

Another innovative and exciting distance education project is British Columbia's Knowledge Network. Kathleen Forsythe and Valerie Collins, in "*Satellite*: The 'Learning System' in British Columbia," demonstrate how technology and ingenuity can eliminate the would-be adult learner's twin bugaboos—lack of time and distance—with no sacrifice of instructional quality or impoverishment of learning experience.

In "*Multimedia*: The Telecommunications Division at Mercer County Community College," George Schwartz provides a view of an effective multifaceted program. The college employs both broadcast and nonbroadcast media to bring educational opportunities to residents of its service area. In addition, the program helps train students for careers in telecommunications and broadcast.

This publication was prepared under the auspices of the Instructional Telecommunications Consortium (ITC) of the American Association of Community and Junior Colleges (AACJC). It is one of a series of ITC publications designed to acquaint postsecondary faculties, administrators, and the general public with the uses of telecommunications in formal and informal education and training. Almost all the projects described herein are conducted by ITC member institutions. Almost all of them are at the two-year community and technical college level.

ITC membership is made up of single community colleges, multi-campus community college districts, and regional and statewide consortia of two-year community and technical colleges that make extensive use of telecommunications in their instructional and community service programs. Commercial publishers of telecommunications-based materials, postsecondary education groups with an interest in instructional telecommunications, and individuals are also members.

Among ITC major objectives are the following: disseminating information about instructional telecommunications media and their uses (as in the present publication); encouraging interinstitutional and interorganizational design, production, and utilization of telecommunications materials; encouraging and supporting instructional telecommunications research; and serving as a voice for postsecondary educators in telecommunications issues and policies that affect their interest.

The current ITC membership list can be found at the back of this monograph. Readers interested in finding out more about the Consortium and its activities are invited to write or call the ITC Director, AACJC, Suite 410, One Dupont Circle, NW, Washington, DC 20036, 202/293-7050.

RIO SALADO COMMUNITY COLLEGE

TELECONFERENCING:

The Homebound Project at Rio Salado Community College

by Helen Sprawls

The Homebound Project at Rio Salado Community College provides an opportunity for severely disabled/homebound people to take college classes in a live, interactive, "classroom" setting through the use of the college's audio teleconferencing system, the SUNDIAL Network.

Rio Salado Community College, located in Phoenix, Arizona, is a noncampus college, a college literally "without walls," whose commitment is to reach students wherever they are. The college's SUNDIAL Network serves what are known as congregate sites throughout the 9,226 square miles of Maricopa County. At present, there are eight such sites, and the number is continually increasing.

In January 1984, the college instituted the Homebound Project, which offers students who cannot travel to a congregate site the opportunity to take classes from home, hospital beds, convalescent or care centers—anywhere there is a telephone. Homebound students are "on line" with regular college classes made up of fellow students who have traveled to Rio Salado's congregate sites located in shopping malls, libraries, businesses and industries, high schools, and military bases. Participation is as simple as making a telephone call.

Helen Sprawls is Director of Instructional Technology and Design at Rio Salado Community College, Phoenix, Arizona.

The College offers other alternative delivery systems—television, radio, videocassette, audiocassette, and correspondence—but these systems are not interactive. The audio teleconferencing system is the only nontraditional delivery system that offers severely disabled/homebound people the important learning and social dimensions provided by group interaction.

For many severely disabled/homebound students, participation in audio teleconferencing classes is their primary social experience. It is the only social contact they have with the outside world, other than when they visit the doctor or hospital or are visited by a home health worker.

Here is what some of them say about the experience:

From a student 25 years old who is a quadriplegic:

> "It feels like a class. There is a united feeling, a camaraderie of students through technology."

From a student 62 years old who is severely diabetic and visually impaired:

> "I really can't describe what it feels like to be part of the outside world. The Homebound Project brought the world to my house. I couldn't get to them, so they came to me."

The Homebound Project is an important resource for all of the seven colleges in the Maricopa Community College District. Students who become disabled/homebound are referred from sister colleges and can continue their education without interruption. The Homebound Project helps these students maintain a sense of self determination.

From a student 20 years old who had rheumatoid arthritis, was enrolled in the Homebound Project, and now has returned to campus:

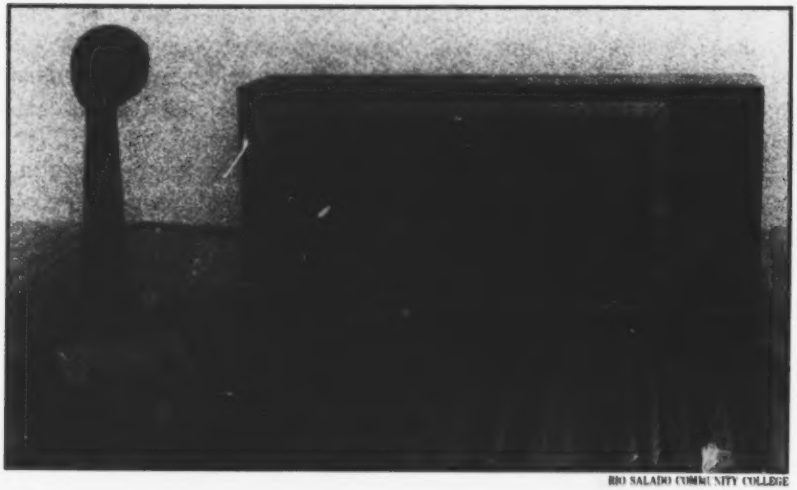
> "The classes gave me a purpose and kept my mind off my problem. I was unable to do much of anything, and I was worried about continuing my education. It was a good experience for me and a wonderful opportunity. I'm glad it was there for me when I needed it."

From a student 20 years old who is undergoing multiple surgeries and takes class from a hospital:

> "I'm in life, even in the hospital."

Who Are Homebound Students?

For Spring 1985, the college registered 115 homebound students. These



RIO SALADO COMMUNITY COLLEGE

students, from 18–91 years of age, included people who took classes for both credit and noncredit, people who were working toward degrees and toward employment goals, as well as people whose goal is a lifetime of learning.

Homebound students include people who are blind, visually impaired, and print-handicapped, as well as people who have debilitating ailments such as agoraphobia, asthma, severe arthritis, cancer, cystic fibrosis, severe diabetes, head injuries, emphysema, muscular dystrophy, multiple sclerosis, and scleroderma. There are students who are deaf, quadriplegic, and paraplegic, in addition to students who are recovering from strokes. Many of the homebound students have multiple handicaps.

One student who is 50 years old says:

> "My disease is an advanced form of a connective tissue disease. My movement is greatly impaired and painful. I'm in an electric bed most of the time. My breathing is sometimes bad, and then I can't speak. I have impaired eye sight. I've had a stroke and several mini-strokes.
>
> "Even though you are physically handicapped, your mind will go handicapped if it's not given a chance to be used. Audio teleconferencing opens a chance for self satisfaction, and that's very important."

During a Spring 1985 term, 31 homebound students would not have been able to travel to a campus or a congregate site to take classes. Even with special transportation, these students tire quickly. Some depend on life support systems, have severe breathing difficulties, need special adaptive equipment, or are in a continually unstable physical condition. Two students take classes in a hospital and three in nursing homes. For other homebound students, special transportation is simply not financially feasible and would, in most cases, require a caregiver to accompany each student to class.

The Homebound Project also serves men and women who are homebound because they must care for others. They too can take classes through the audio teleconferencing system. This spring, in fact, 14 students are homebound caregivers who are not disabled. They can be spouses caring for wives or husbands recovering from strokes or parents caring for handicapped children.

Here are some of their comments:

From a student 65 years old, caring for her husband who is recovering from a stroke:

> "Often, my husband needs me. If I'm on the phone, I can just leave the class and come back later. This is the greatest thing for me. The instructor really makes me think."

From a student 81 years old and legally blind, caring for his wife who is bedridden with severe arthritis:

> "Where there was loss of self respect, you opened the door to self improvement. Thank you from the bottom of my old heart for the renewed hope and interest in learning something new every day."

How Does The Homebound Project Work?

The Homebound Project equalizes educational opportunities for severely disabled/homebound people. Through audio teleconferencing, students are able to participate unselfconsciously in a classroom environment. For many students, this is a first step to re-entering the outside world.

From a student 47 years old whose condition is very disfiguring:

> "I'm so excited. I feel so alive. I've something to get up for."

From a student 52 years old, recovering from a stroke which has left his voice impaired:

> "Because no one sees me, I feel uninhibited. I don't feel rushed or pressured when I speak in class."

The Homebound Project meets each student's needs on an individual basis but within an educational setting. All necessary services for homebound students (counseling and advisement and the regular support mechanism of the audio teleconferencing courses) are provided by the college or the college acts as a referral resource working with community and state agencies charged with serving disabled/homebound people.

The Homebound Project operates with two staff members—a director and a student support person. The director's major task is community awareness, which involves working with over 200 agencies and organizations in Maricopa County. Many of these agencies send out announcements of classes, feature the Homebound Project in their newsletters, and refer potential students to the college.

The student support person registers students and keeps in close touch with them throughout the semester. Homebound students can easily become very frustrated, especially during their first semester. A great part of the project's success lies in its ability to keep in touch and help solve each student's unique problems as they arise.

Everything is done by telephone or through the mail. To register for class, all students have to do is call the Homebound Project. They are advised about classes, helped to arrange for taped textbooks and course materials, if necesssary, and assisted with any special needs they might have. For example, if a student cannot write, he or she can turn in assignments on tape. The student needs to be aware of options and how to successfully function in class.

All audio teleconferencing classes are recorded live, so students never have to miss a class. If they are absent, they can request a tape of the class. This is a vital resource for students recovering from strokes or head injuries. It allows the student to listen to the class in small segments on a tape playback machine, usually working with a speech therapist, and this helps the student to recover mental capabilities that were damaged or impaired. Students who have mobility problems can order a headset from the Homebound Project, and this allows them the freedom to listen or participate from virtually any position.

The Homebound Project is designed to allow homebound students to be as independent as possible. Many of them do not have other people to do things for them—such as to make trips to the bookstore or to type up assignments. The Homebound Project provides them with ways of accomplishing such tasks.

From a student 20 years old who has muscular dystrophy:

"The support services for the Homebound Project were just perfect. I never had to leave the house or wait for materials or anything like that."

In Fall 1984, the college established the Homebound Student Union. Students now can call in on Saturdays and Sundays from 1-3 pm and just talk to each other. Some have formed friendships through the SUNDIAL Network, and this has increased their self confidence and helped them to achieve a sense of belonging.

What Does Tomorrow Hold?

The Homebound Project is still very new. From January 1984 to January 1985, it registered over 200 students. The project works closely with agencies such as State Rehabilitation Services to develop options for those severely disabled/homebound students seeking employment. Goals change daily as students call with new ideas and new problems.

Rio Salado Community College has a strong commitment to offering education to everyone who can profit by it. The Homebound Project is one of the institution's most exciting and most successful projects. It is certainly worth the time and effort. One student who is 50 years old tells why:

"My disease is marked terminal. Life should have ended three years ago. I could give up, but instead I decided to reach out and dream a little with Rio Salado."

AUDIOCASSETTE:

A Literature Course from the Bay Area Television Consortium

by George A. Willey

The first thing that must be made absolutely clear about college courses on audiocassettes is that such courses involve much more than simply listening to recordings. We seldom hear traditional courses described as "college courses in the lecture hall" because that would not be a useful or accurate description of what constitutes a normal course of study. A "college course" is understood to describe a multifaceted learning experience. Lectures are the most predominant element of traditional instruction, but whatever goes on in the classroom represents only a part of the total learning experience. The student is usually expected to spend at least as much, and generally a good deal more, time studying and completing exercises outside of the classroom. It is the mix of varied learning activities—in class and out—that is universally understood to be "a course."

The same is true of most methods of instruction and learning developed as alternatives to the campus-based lecture course. To be more specific, and to use audiocassettes as an example, courses utilizing cassettes generally rely upon three major elements: the local instructor, the subject matter recordings, and the text and other study materials. While these elements closely resemble the basic components of more traditional instruction, each

George A. Willey is Director of the Bay Area Television Consortium in Palo Alto, California.

is different in form: the role of the campus instructor is changed from lecturing to providing an overview and individual student assistance; the lectures are recorded; and additional reading material is required to guide students from recordings to texts and supplementary reading. Taken together, these elements provide a learning experience that is quite different from that with which students and instructors are most familiar.

Background

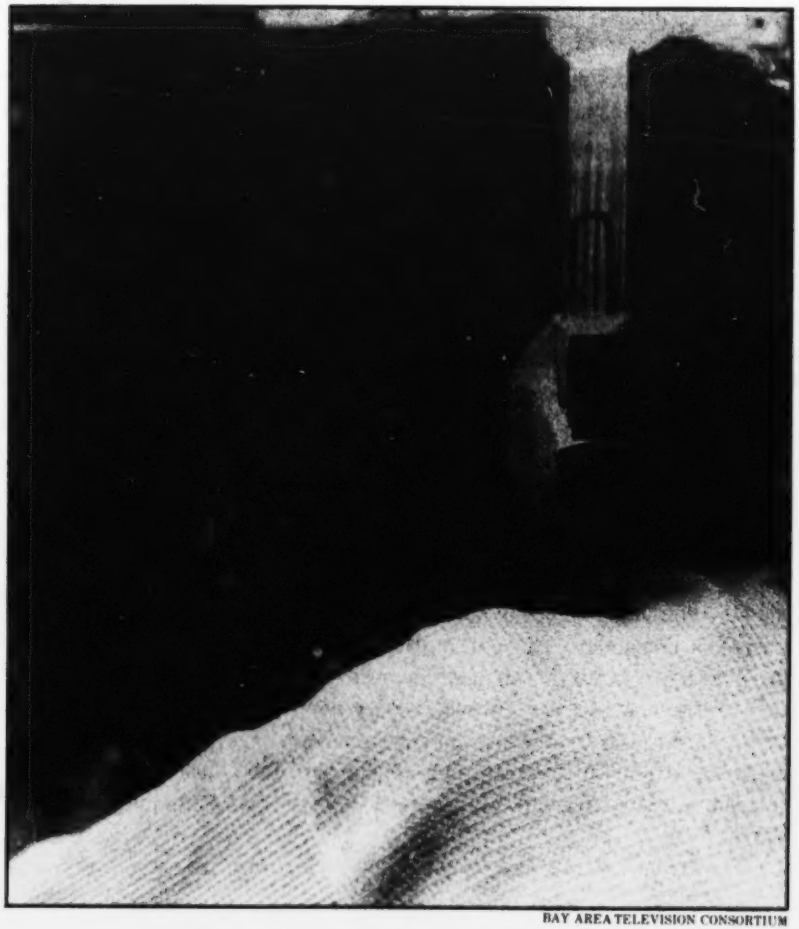
Audiocassettes have been used for instructional purposes ever since compact cassettes became a more convenient alternative to reel-to-reel recording. Scores of short courses and training programs were created by various industries as a means of upgrading specific skills. Other noncredit courses were adapted to audiocassettes in a variety of self-help subject areas as dissimilar as income tax preparation and the discovery of inner peace. A few—very few—colleges and universities experimented more than a decade ago with the recording of lectures as a means of making credit courses accessible to nontraditional students.

The quality of nearly all such early efforts fell into the category described by Victor Borge who, when asked to evaluate original compositions submitted to him for his critical judgment, concluded: "Some of them were pretty good and the rest were even worse." Most of the original audiocassette courses suffered from two major limitations: (1) a narrowly limited concept, based on the assumption that recorded lectures were all that were needed for an easily accessible and comprehensive course of study; and (2) the lack of sufficient experience and/or resources to apply a high level of instructional design and production values to such recordings.

The growing popularity of television quickly overshadowed earlier audio efforts. Television production involved a substantial financial investment, which in turn made possible a relatively high standard of presentation. The addition of sight to recordings was, of course, a tremendous advantage in most areas of instruction, and for a time relatively little attention was given to utilizing audio alone. During the past few years, however, and even as video instruction continues to improve, educators are beginning to rediscover the audiocassette as an effective and less expensive alternative mode of instruction.

Advantages and Limitations

The lack of visual elements in audiocassettes is in fact offset by several particular advantages. In certain instances, visual elements are not really



BAY AREA TELEVISION CONSORTIUM

necessary and may, in fact, be counterproductive. The unseen voice creates a remarkably intimate quality of communication, the sense that the speaker is addressing the listener alone, rather than a general audience.

The consortium of colleges in the San Francisco Bay Area is currently developing an audio course, "Introduction to Poetry," which will benefit tremendously from the fact that no visual distractions will be present. Granted, one might like to see what one or more of the poets looks like, but the subject of this course is poetry, not poets. These same colleges

previously elected to produce two literature courses on audio cassettes, rather than on video.

One early example of literature on audiocassettes, "Shakespeare by Ear," was a series of lectures recorded by the University of Iowa to extend the introductory Shakespeare course to a greater number of students. Although the use of student actors somewhat diminished the over-all quality of presentation, the lectures were scholarly and extremely well-written for the ear alone.

Television has in the past offered several very fine dramatizations of short stories and novels. But these visual presentations inevitably become drama, some other writer's adaptation of one form of expression to another: close, but different. Interest in the literature may give way to preoccupation with actors and acting, camera work, scenery, musical backgrounds, and other distinctive elements of television drama.

A very high quality of audio production can be accomplished at a small fraction of the cost required for television production. In addition to the audio engineering common to both media, television necessarily involves camera crews, studio sets or travel to locations, lighting, graphic art work, props, rehearsal, etc. Post-production work—editing—is far more complicated for video than for audio. Although every situation has its own variables, one general rule of thumb is that television production is at least 20 times more expensive than audio production, and some would place the differential much higher. Stated another way, some 20 audio courses can be produced for the same amount required for a single telecourse. In view of such a dramatic contrast, it is appropriate for educators to ask: is a telecourse really 20 times as effective? Will 20 times as many students be served?

The University of Michigan is working on an introductory college course in psychology, "The Seasons of Life," tentatively scheduled for completion in the fall of 1987. The mediated course will consist of five video programs and 20 audio programs. This combination of media, well-tested by the highly successful British Open University, is based on the premise that not everything has to be seen. Because television production is so very expensive, a great deal of money can be saved by limiting television to those subjects that will particularly benefit from visual presentation, using radio for the rest.

Still another contemporary example of using radio to best advantage, together with strong print support is "Small Business Management," a course produced in 1983 by the Rio Salado Community College District and National Public Radio. The 26 instructional programs in this series

use a variety of radio production techniques to great advantage, with the result that the listener's imagination is engaged more actively than is the case when visual presentations are made.

Courses produced for distribution by radio can also be recorded on audiocassettes. By so doing, the instructional programming can be made even more flexible. Except for campus outlets, the majority of radio stations in the United States do not maintain a program schedule that lends itself to carrying half-hour instructional broadcasts. Even worse, many communities remain altogether unserved by public radio stations. Cassette recordings, in contrast, can be reproduced in sufficient quantities to provide for distribution in a variety of ways—through college learning centers, bookstores, public libraries, military bases, senior centers, convalescent homes, prisons, even via mail to distant students. Such flexibility represents a distinct advantage to this system of learning.

A final cost consideration is the relative economy with which one or more audio lessons can be updated from time to time, in contrast to the substantial problem of re-shooting television lessons which may have become dated. Audiocassettes are inexpensive and can be duplicated for broad distribution very easily at low cost.

In addition to the cost savings to institutions and to students, audiocassettes have an advantage over videocassettes with respect to accessibility and flexibility. While it is true that a growing number of individuals own video playback equipment and that all colleges make such equipment available to students, such accessibility still falls far short in comparison with audio. Far more adults have access to audiocassette players, enabling them to adapt such instruction to their own personal schedules.

Such advantages as these encourage colleges and universities to include the use of audio cassettes among the growing variety of options becoming availabe to nontraditional students who, for so long, remained unserved or underserved by campus-based instruction.

An Audio Course: "Twentieth Century American Fiction"

Reference has been made to several literature courses adapted to audiocassettes. A recent example is "Twentieth Century American Fiction." A review of the development of this course will illustrate several of the points made above with respect to choice of medium, comparative costs, and other production considerations.

One of the advantages enjoyed by colleges working together in consortia is that regular meetings of the organizatio·ı provide ready-made op-

portunities to exchange ideas and recommendations as to needs and projects. In this manner, the 20 community colleges constituting the Bay Area Television Consortium (BATC) determined that a need existed for an introductory literature course designed expressly to reach adults who were unable to attend classes on campus.

Having established this particular need, an immediate choice of medium had to be made between audio and video. Because the Bay Area organization is a television consortium, it was only natural that first consideration was given to television. It was immediately apparent, however, that television would not be a good choice for this project, for a variety of reasons.

First and foremost, this was to be a three-unit literature course covering exactly the same material included in the equivalent campus-based course. In this specific example, the modern American fiction course taught by the same instructor on campus, covered eight novels and 31 short stories. It was considered imperative, therefore, that essentially the same number of lessons be provided in order to assist the student with the high volume of outside reading. This meant that 44 lessons needed to be adapted to media. Telecourses, however, typically consist of from 26 to 30 lessons, a limitation imposed in part by the high cost of production, as well as the cost and limited availability of broadcast time. Another factor justifying abbreviating the number of lessons in a telecourse is television's great success in compressing information by means of effective instructional design and visual presentation.

While no universal conclusion can be drawn from this specific decision relating to literature, the participating colleges in this instance determined that a three-unit lecture course of the kind planned should involve no fewer than 44 individual lessons. Even if unlimited station time had been available, the cost of creating 44 half-hour television programs was far in excess of college capability. Estimates of television production costs continue to vary enormously in relation to the many variables encountered in covering different subject matter, but high quality telecourses seldom involve an investment of less than $500,000, and most such courses created for national distribution now cost more than a million dollars to produce. Given a production budget of less than $30,000, which had to include the cost of print support materials as well as instructional design and recording, the choice of audio over video was not surprising.

Moreover, as suggested earlier, a video approach to literature almost surely would have involved dramatizations which, while entertaining, are really not the same thing as literature. Striving to provide an equivalent learning experience, recorded lectures were judged to more closely parallel

the classroom experience in which students may profit from the wisdom and enthusiasm of an instructor whose understanding and love of literature motivate them to read more intelligently and purposefully.

The instructor who designed the course and prepared and recorded the lectures was Grant L. Voth of Monterey Peninsula College in California, who had previously recorded a course in "Nineteenth Century American Fiction." Supported by a U.S. Department of Education grant from the Fund for the Improvement of Postsecondary Education, Dr. Voth was able to devote nearly two years to designing the course and preparing individual lectures. The result: 44 recorded lectures, each with original music backgrounds and many with literary segments read aloud by professional readers.

Compressing typical 50-minute classes into 30-minute lectures, the recordings successfully blend careful design and structure with seemingly informal and highly personalized delivery. Recorded on both sides of 22 cassettes, the lectures are packaged in a large notebook-size binder for easy storage and access. Of equal importance to the recordings is a 300-page student study guide prepared by the instructor to accompany the lectures. The study guide connects individual lectures to the reading that each student will undertake, providing abundant background information as well as objectives, activities, self-tests, and suggestions for further reading within each of the nine units of study.

In the introduction to the study guide, Dr. Voth prepares the reader not only to anticipate the content of the course but also to experience a rather unorthodox alternative method of learning. The statement is worthy of quoting at length:

> Assuming a reasonable level of interest, motivation, and willingness to work, there is no reason why this course should not be as "substantive" as a comparable course you take on campus. In fact, all other things being equal, there are factors in this one that can make it *more* effective than some campus classes. The half-hour recorded lectures present the course instructor at his very best: his script has been checked by discipline advisors and by media advisors, professional readers are at hand to help with passages from stories and novels, and a host of technical experts have worked to make the lectures as acoustically perfect and as interesting as possible. If you think back over all the campus classes you have taken, you will probably have to admit that those variables are not always so precisely controlled in a classroom. Ad-

ditionally, assuming that you have physical possession of the audio tapes and a cassette player, you can stop the lecture to re-listen to parts or all of it, to take notes on its material, or to answer the telephone—a control you never have over a classroom lecture. Finally, every step of this course is marked by a self-quiz, so you can know how well you have mastered that step before you move on to the next. This scarcely ever happens in a traditional class. You can never get behind, nor will you ever have to *guess* whether you have mastered one topic before you go on to the next. These are real advantages over a traditional class, and they give you a chance to learn as much (if not more) in this one than in a comparable campus offering.

Conclusion

Having now experimented with the use of audiocassettes as the primary mode of instruction in several different academic disciplines, the Bay Area consortium of colleges intends to continue to expand such utilization among the growing number of options provided by instructional media. The experience gained thus far strengthens the conclusion that not every subject can be effectively taught in this manner, nor is it an effective method of learning for every student. But for many subjects, and for a great many students, audiocassettes offer distinct advantages as an alternative method of learning.

If comparison with other modes of instruction must be made, such comparison should in all fairness be addressed to the learning that takes place rather than to the method of instruction employed. Any college course offering academic credit for completion should be evaluated not by its method of delivery but by its content and the student mastery thereof. What is lost by hearing a lecture on tape, rather than in person, is more than compensated for by hearing it in an atmosphere of private concentration, hearing it at the most favorable time possible, hearing it repeated at will and, for many adults, the opportunity of hearing it at all.

As far as instructors are concerned, perhaps the best result of such an effort to date has been the gratification that comes from their professional growth. In utilizing this means of reaching nontraditional students, instructors engage in a highly creative and challenging undertaking, one in which they are motivated to do absolutely their best work. It is a stimulating professional and personal experience for the instructor,

recognizing that something very tangible and lasting is being created which will be helpful to students for years to come.

WAUBONSEE COMMUNITY COLLEGE

VIDEOCASSETTE:

Telecourses from the Northern Illinois Learning Resources Cooperative

by Ralph G. Steinke

The Northern Illinois Learning Resources Cooperative (NILRC) was formed more than ten years ago. From its very beginning, one of the cooperative's primary areas of interest and involvement has been instructional television. Indeed, the major explanation for NILRC's remarkable membership growth, from eight institutions in 1973 to the current 37, has been its successful instructional television track record. A unique feature of this success, however, has been the NILRC delivery method—nonbroadcast videocassette. This success has occurred despite the fact that the base of NILRC's membership strength lies in a major broadcast market, the Chicago metropolitan area.

There are two reasons for this:

- First, the early NILRC membership comprised of suburban Chicago community colleges, discovered that delivery options were limited to them. Open air telecasting proved discouraging and often expensive because few commercial or PBS stations showed much enthusiasm for cooperating in an educational venture they regarded as having low potential in profits or viewer

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interest. Cable casting posed a different problem. The myriad of cable companies between and within college districts created negotiating situations of such complexity that each institution had to decide for itself whether it would or could use cable delivery effectively. In the end, the only delivery option that appeared practical, therefore, was that of nonbroadcast videocassette.

- Second, the videocassette method lent itself much more easily to a flexible format. Not being locked into a rigid broadcast schedule allowed for variable student entrance/exit procedure, thus permitting students to enroll at any time. In addition, the nonbroadcast videocassette method offered conveniences that broadcast could not. Even though the students initially had to leave the comfort of their home to watch videocassettes, the colleges established convenient and easy-to-reach viewing locations (often in public libraries). These locations, open long hours, permitted students to view one or more lessons at a time and to study at a rate convenient to them. The rewind button on a videocassette recorder also made review of subject content an easy and attractive feature to students.

Many of the conveniences of nonbroadcast videocassette were not realized at first because of the original 3/4" equipment. Bulky and heavy, the player could hardly be considered portable. Besides that, its cost was prohibitive to the individual consumer. Also, most educators, fascinated by the glamor of broadcast television, regarded nonbroadcast videocassette as a rather primitive method to be used only in the absence of anything better. Nonetheless, a number of NILRC institutions continued to build their programs and enrollments via videocassette.

With the advent of 1/2" equipment, the picture dramatically changed. Equipment became truly portable and prices were substantially lower, placing units well within the reach of individual consumers. The recent boom in the sale of videocassette recorders (VCRs) has added further nonbroadcast convenience. As a result, NILRC colleges now circulate video lessons for home use, just as their libraries permit students to check out books. In short, nonbroadcast videocassettes, through use of the VCR, offer a self-paced learning environment with few restrictions.

Presently, the nonbroadcast videocassette method accounts for more than 90 percent of telecourse enrollments at NILRC colleges. Even though recent developments in broadcast and cablecast delivery hold some promise

for enrollment increases, the nonbroadcast method still continues as the major way to serve telecourse students. In 1983–84, out of 9,683 telecourse enrollments, the nonbroadcast mode accounted for 9,105. A number of NILRC institutions plan to continue to build nonbroadcast enrollments by expanding the circulation of video lessons from off-campus sites and lending inexpensive playback equipment to students who do not own VCRs.

Operating a Videocassette Program

A typical telecourse program at a NILRC college is similar in many ways to programs that utilize the broadcast method. There are, however, certain features that are critical to the support of the NILRC videocassette method. The first of these is the presence of an automated registration system that will accommodate continuing entrance/exit. Because students are enrolling in and completing courses at any point in the school year, it is essential that accurate records are kept. With increasing enrollments, an automated registration system becomes a necessity.

The orientation of telecourse students in a self-paced environment also requires special handling. Since students do not all begin together but are constantly at various progress points, it is almost impossible to schedule group orientation sessions. Instead of group sessions, NILRC institutions generally use other orientation devices. An orientation packet is distributed free through the college bookstore when a telecourse student purchases a textbook and study guide. The packet includes a course syllabus prepared by the instructor. Contained in the syllabus is general information about:

- how the course is set up;
- where and when tapes may be viewed;
- how to check out the tapes;
- what print materials are required;
- what the tests are like and where and when they may be taken;
- how a student's course grade is determined;
- how an instructor can be contacted; and
- helpful hints on how to enhance chances for successful course completion.

In addition, packets usually include a telecourse student's guide with information on various logistical and study procedures. A third handout lists the hours the testing center(s) are open.

Another orientation instrument is a locally produced introductory

videotape, featuring the course instructor. This orientation tape serves the important purpose of associating the instructor's name with a face, thereby making it easier for a student to contact the instructor should questions or problems arise.

A further consideration when operating a videocassette program is the tape distribution system. As a videocassette telecourse program grows, both in terms of course offerings and enrollments, tape duplication becomes a major concern. In other words, more copies of more tapes are needed. NILRC colleges with larger programs have abandoned in-house duplication and, instead, contract with commercial duplication houses to provide needed copies. Of course, it is mandatory that duplication rights be acquired in contracts with the telecourse producers or distributors. For this reason, NILRC attempts whenever possible to negotiate unlimited duplication rights.

Equipment servicing also becomes a major concern as the videocassette program expands. The purchase of high quality equipment, compatible with equipment already owned, is the first step. The high cost of outside video equipment repair has forced most NILRC colleges to employ repair technicians, most of whom repair other types of campus audiovisual equipment as well. NILRC institutions have learned that the success of a nonbroadcast program can hinge upon reliable and fast equipment repair.

A successful videocassette program requires the establishment of viewing or satellite locations, usually in public libraries. The constant liaison and logistical work that must go on between college and viewing location staffs demands well defined communication channels.

Staff members in public libraries generally are receptive to the idea of their facility serving as a satellite location, because this additional service can attract more library users and build community support. These benefits, however, are offset by the amount of staff time required to support this service. It is important, therefore, to cultivate continuing good relations with library staff members.

Conclusion

This report describes how a number of institutions in one large consortium came to offer telecourses by the videocassette method. The experience has been a constant learning process as the project has grown and diversified. Space limitations have made it impossible to describe the various courses, and it would be unfair to select just one or two courses as exemplary. However, telecourse coordinators or learning resources staff

at the colleges listed below will be happy to supply more information on request.

NOTE: NILRC colleges offering telecourses are:

Belleville Area College
College of DuPage
College of Lake County
Elgin Community College
Frontier Community College
Governors State University
William Rainey Harper College
Illinois Central College
Illinois Valley Community College
Lewis and Clark Community College
Lincoln Land Community College
John A. Logan College
McHenry County College
Moraine Valley Community College
Morton College
Oakton Community College
Parkland College
Prairie State College
Rend Lake College
Carl Sandburg College
Triton College
Waubonsee Community College

BAY AREA TELEVISION CONSORTIUM

VIDEODISC:

A Report on Science Laboratory Simulations*

PETER J. DIRR

by Peter J. Dirr and Victoria Murphey

The Annenberg/CPB Project was established in 1981 to explore new ways that telecommunications technologies could be used to increase access to higher education and improve the quality of courses. With $150 million from The Annenberg School of Communications over a 15-year period, the project is administered by the Corporation for Public Broadcasting.

Toward the end of 1981, the project funded the University of Nebraska-Lincoln to create and field test six videodisc science laboratory experiments, two each in biology, chemistry, and physics. The purpose of the project was to explore whether the videodiscs could effectively simulate undergraduate science laboratory instruction.

University personnel had argued that it is increasingly expensive to offer science laboratory instruction because of the cost of equipment and the lengthy time required to set up and break down complex experiments. Furthermore, they contended, science laboratories are often open only eight to ten hours per day and are not, therefore, readily accessible to nontradi-

*This article is a summary of a more extensive research report prepared by Dr. Barbara Gross-David of the University of California-Berkeley.

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tional students. Because the Annenberg/CPB Project had been established to increase access to higher education for nontraditional students, the Project was interested in exploring ways to overcome these barriers.

Videodisc simulations of science experiments were seen as a way to 1) lower costs (once produced, discs can be copied for about $15, and the costs of hardware systems are expected to drop to within the $1000 to $2000 range), and 2) increase accessibility (disc players can be placed in libraries which are often open 18 to 24 hours per day). The investigation's major question was whether science laboratory experiments could be adequately simulated and could be as instructionally effective as traditional laboratories.

The six discs were field-tested with nearly 700 college students and 45 instructors in seven colleges and universities across the country. The field tests yielded information on the following: instructional, pedagogical, and production qualities of the discs; faculty and student acceptance of this approach; comparisons with traditional science laboratory procedures; and costs of the new technologies compared with traditional approaches. This paper summarizes the findings of the field tests.

Experimental Design

The design of the evaluation allowed faculty members to use the videodiscs in whatever manner they judged appropriate, rather than imposing constraints on how participating institutions should use them. This enabled evaluators to address a disc's performance in actual institutions and curricula. Of the students participating, 506 performed videodisc simulations, and 183 performed traditional "wet" laboratory experiments. Two of the institutions assigned students randomly to videodisc, while four universities asked for student volunteers to conduct the simulations. At one institution, the videodisc simulation was a course requirement.

Effects in Learning and Attitudes

To assess the effects of the videodiscs on student learning, evaluators examined samples of their worksheets and analyzed instructors' perceptions as well as students' self-reports.

Worksheets showed that students were generally able to understand the concepts and ideas presented on videodiscs. In open-ended comments, students reported learning the following: content-related facts, ideas, major theses; scientific processes; the use of videodisc equipment; and scientific reasoning. In addition, they reported that what they had learned was worth

the effort they had made. When looking at test score data, evaluators consistently found that videodisc students performed as well as, or better than, their "wet" lab counterparts.

The study found that in a traditional "wet" lab, the performance of the experiment tends to overshadow other phases of preparation and analysis. The videodisc simulation, however, integrates all three phases of the laboratory experience—preparation, experimental observation, and analysis—and requires students to be actively engaged in the preparation and the design of the experiment, including choosing variables and parameters.

The students indicated that all six videodisc simulations had been very effective for teaching basic principles, but "average" in helping them to understand and calculate results. Students seem generally satisfied with the discs as a useful learning experience, a response similar to that of students who learned through traditional laboratory experiments.

The study also found that students who used the videodisc simulations were significantly more confident in following instructions than their traditional laboratory counterparts. This confidence most likely reflects the consistent precision required by the computer used to control the videodisc. Students also reported being neither bored nor confused during the simulated laboratories. When asked what they especially liked about the new medium, students and their instructors singled out the opportunities for self-pacing and user control. They also valued the immediate feedback and consistency of presentation. Students reported that they would like to see more laboratories on videodisc but were ambivalent when asked whether they prefer the videodisc simulations over traditional laboratory experiences.

Faculty Acceptance of Videodisc Science Labs

Nearly all faculty members involved in the experiment recognized the potential of videodiscs for teaching science experiments and acknowledged that well-conceived, high-quality discs could be a very useful teaching tool. Many saw the videodisc as supplementing rather than replacing traditional "wet" labs. Many, however, were also enthusiastic about using videodiscs to provide experiences not possible through other means. For example, high costs, scheduling restraints, and space limitations often deny non-science majors the opportunity to take any science laboratory courses. Videodiscs were seen by the faculty as appropriate substitute laboratory experiences for those students.

One interesting finding of this study is that the discs were less well received at research universities than at smaller colleges and universities. It was noted that large research institutions typically have greater resources and more specialized faculty than smaller institutions and do not have as great a need for the experiences provided by the videodisc laboratories. Consequently, research university faculty maintained that the current versions of the videodiscs might provide an appropriate supplement to their traditional laboratory classes but should not be used to replace those classes. In contrast, users at state and community colleges were more positive about using the videodisc experiments in place of traditional laboratories.

Quality of Content

• *Biology.* The two biology videodiscs evaluated are entitled "Respiration" and "Climate & Life." While using the "Respiration" videodisc, students determine experimentally the effects of varying temperatures upon the respiration rate of three common organisms. Students select the organisms and temperatures they wish to study, observe the organisms at the selected temperatures, record dye movement through a manometer at selected intervals, and chart changes in respiration rate. The "Climate & Life" videodisc explores major geographical areas of the world *(biomes)* and their corresponding plant and animal life. Students can view ten biomes, such as tundra, chaparral, and tropical rain forest; study life forms, terrains, and climatograms of the biomes; and explore, interactively, factors that determine biome distribution.

The quality of the videodisc content for both biology courses was rated by students and faculty as equivalent to that of traditional laboratories. "Respiration" generally was rated higher than "Climate & Life," but both were rated high in terms of accuracy, currency of information, appropriate use of examples, appropriate vocabulary level, completeness, use of sound pedagogical principles, and likelihood of promoting understanding of the concepts. In particular, students rated highly the readability of the text, instruction, feedback provided the student, visual images used, and opportunities to review and skip parts of the lesson. Student worksheets and the instructor manual, however, were rated weak for "Climate & Life."

In spite of the high ratings they gave to specific characteristics of the biology videodiscs, the faculty generally maintained that the discs were inferior to other instructional approaches, such as "wet" laboratory experiences, standard textbook presentations, and laboratory manual presenta-

tions. Nevertheless, the faculty generally considered videodiscs to be appropriate for independent learners who otherwise would not have access to any laboratory experiences. "Climate & Life" was also thought appropriate for college freshmen and sophomores and high school seniors, especially as a supplement to "wet" lab experiences. Overall, the production value of the biology discs received higher ratings than the instructional value.

• *Chemistry.* The two chemistry videodiscs are "Titration" and "Chemical Decision Making." In the "Titration" videodisc, the student is taught to determine the concentration of a solution. By first learning the basic concepts and techniques of titration, the student is then able to proceed with a large number of experiments by varying the initial parameters stored in the computer. "Chemical Decision Making" allows the student to mix electronically several hundred possible chemical combinations and challenges him to observe chemical reactions, calculate unknowns, and explore properties of different elements.

Both experiments received high scores for accuracy, currency, appropriate uses of examples, and appropriate reading/vocabulary level. They received only average scores for the difficulty of the challenge provided, the amount of new information presented, and the level of information. But "Chemical Decision Making" was rated especially high on sophistication of logic and reasoning, motivating and interesting students, and provoking higher-order thinking.

In rating the instructional features of the laboratories, both students and faculty gave the discs high scores for opportunities to review and skip parts of the lesson, visual images used, feedback provided to the student, readability of text, and opportunity for students to work at their own pace.

When instructors were asked to compare the videodiscs with other instructional methods, they replied that "Chemical Decision Making" exceeded their expectations, although most did not consider it a suitable substitute for "wet" lab experiments. "Titration" ratings were average in all areas.

Instructors thought that both disc programs were appropriate for college freshmen and sophomores and high school students. "Chemical Decision Making" was also considered appropriate for independent learners. Overall, production quality and instructional value were rated high or above average for both discs.

• *Physics.* "Studies in Motion" and "Energy Transformation" were the two physics videodiscs evaluated by students and instructors. The "Studies in Motion" videodisc provides instruction in kinematics centered on measuring the motion of divers, gymnasts, and ballet dancers. The com-

puter software was developed for students with little mathematical background and is designed to lead them through an exploration of four kinds of motion: free-fall, up-and-down, projectile, and rotational. By moving the cursor on the screen, students can take measurements for numerical calculations. The "Energy Transformation" videodisc shows energy transformations that occur while a bicycle is being ridden. Energy losses due to rolling and wind resistance are determined from airport runway and wind tunnel sequences on the videodisc. Energy output is computed from kinetic energy of the bicycle and cyclist, measured on rollers in the laboratory. Using this videodisc, students can compute velocities and accelerations as a function of time in ways difficult to achieve through other instructional media.

Both experiments were highly rated for accuracy, use of examples, currency of information, and promoting concept understanding. They were rated average, or slightly below, on difficulty of the challenge provided to the student, amount of information, and level of information. Instructional features that were rated high included opportunities for students to work at own pace, readability of text, visual images used, instructions, explanations, and student worksheets and review. Both labs were considered equivalent to, or slightly better than, other instructional methods.

Instructors viewed both "Studies in Motion" and "Energy Transformation" as appropriate for lower-division college and high school students. About half of the respondents viewed the discs as appropriate for independent learners as well. Production quality was rated high by the faculty.

Comparisons With Traditional Laboratories

In comparing videodisc simulations with traditional laboratories, evaluator found that clear distinctions must be made between the benefits of an experiment conducted on videodisc and an experiment conducted in a traditional laboratory setting.

- *Time.* Students using a videodisc typically work through an experiment more quickly than in a conventional laboratory where students spend time setting up, waiting between data collection points, cleaning up, and correcting errors. Using the videodisc in "Respiration," for example, students need not wait for the temperature changes but can see the results almost instantly. Students who spent only 40 minutes with the videodisc were able to carry out a complete experiment of one organism at three

temperatures. By spending 60 minutes, the number of organisms can be increased to two or three, whereas in a traditional laboratory this same experiment can take up to three times as long to complete.

• *Content.* Videodiscs enable students to examine a wider variety of conditions than is possible in the traditional laboratory. Students can explore more unknowns, investigate more organisms, study more biomes, and perform experiments over a wider range of conditions.

• *Procedures.* Students using videodiscs appear less confused about what to do than students in the traditional laboratory who must frequently check with the laboratory assistant to make sure the experiment is being conducted accurately. The videodisc provides a more structured, yet individualized, approach than most laboratories. Interactive preparation is obligatory for videodisc students, who must work through preparatory sections before conducting an experiment. This is not necessarily so in traditional laboratories, where preparatory lessons leading up to the laboratory experience tend to be left to the option of the student. In the traditional laboratory, with its one assistant and 20–30 students, students receive less individual monitoring and tutorial assistance. As a result, students cannot always get the timely clarification or correction always forthcoming from the ever-patient computer used to control the videodisc simulations.

• *Task-Oriented Behavior.* Because videodisc provides fewer distractions for students, students appear to be more task-oriented and almost completely focused on conducting the experiment. Students in traditional laboratories exhibit a wider variation in behavior, and the time actually spent on the task can be short. Some students in traditional laboratories focus on the experiment, but others may just be marking time. In many cases, students become restless toward the end of a three-hour laboratory period. Videodisc students are allowed to stop the program at key points. Consequently, less restlessness or distracted behavior was observed.

• *Pedagogical Advantages of Videodisc.* Because students have to make choices and respond to the program, they become actively involved in learning. Research literature shows that learning increases when students become active learners and receive feedback on their efforts. In addition, a wide range of student abilities can be served by a single videodisc program because videodisc can match the pace and timing of presentation to a learner's requirements. Students can be routed to appropriate remediation sections of the disc as necessary, and they can repeat and review sequences that they do not understand or that they wish to explore more carefully.

Comparative Costs

Costs for developing and using videodiscs are not well established and depend on a number of factors, including the ratio of film footage to still frames, the degree to which electronics and computer-generated graphics can be used to create still frames, the number of iterations carried out in the formative stage of development, the extent to which preexisting film footage can be used, the size of the development team working on the disc, the desired quality of the product, the production facilities used, and the type of production (e.g., studio or on location).

Widespread use of videodiscs will depend on lowered costs, which, in turn, will depend on the vagaries of the videodisc industry. Costs of hardware are declining, however, and many colleges and universities are experimenting with videodisc. Over the last several years, the cost of microcomputers has decreased by 30 percent, and videodisc players by 20 percent. Moreover, interface devices to control a videodisc player by a microcomputer are becoming easily available. While the initial hardware and software are currently expensive (about $3500 per unit), recurring costs are less for videodisc than for traditional laboratories.

Conclusions

The major question examined by this study was whether science laboratory experiments could be simulated adequately and be as effective instructionally as traditional "wet" labs. The study found that students using the videodisc simulations consistently performed as well as, or better than, students in traditional laboratories. Furthermore, the videodisc group worked through the experiments more quickly and were able to experiment with a wider variety of conditions than the traditional laboratory students.

Nearly all faculty recognized the effectiveness of videodiscs in simulating science laboratory experiments. But they are ambivalent as to whether videodisc simulations are appropriate substitutes for—as opposed to supplements to—traditional "wet" labs.

There was little ambivalence, however, about two applications of the videodisc simulations. First, faculty agreed that they are appropriate in teaching experiments that otherwise could not or would not be taught (e.g.,

because of cost or dangerous conditions). Second, they can teach students who do not have access to traditional science laboratory instruction, that is, independent learners.

CENTRAL PIEDMONT COMMUNITY COLLEGE

SLIDE/TAPE MODULES:

Developing Learning Materials in the North Carolina Rural Renaissance Consortium

by Norman Petty

The State of North Carolina has a large adult rural population with continuing educational and training needs. An estimated 70 percent of adult North Carolinians, in a state that is 55 percent rural, desire college-level training. The North Carolina Rural Renaissance Consortium (NCRRC) was organized in 1976 by community college educators to address the specific problems of these adult learners.

One strategy to extend opportunities to rural residents was formulated by the late Dr. Peter Goldmark, inventor of the long-playing record and head of CBS laboratories. Dr. William McIntosh, Vice President for Educational Planning and Evaluation at Central Piedmont Community College in Charlotte, North Carolina, and a key figure in NCRRC, read in the *Wall Street Journal* about a new television system being developed by Goldmark that had the potential to help rural residents. The system, called Rapid Transmission and Storage (RTS), was designed to compress a half-hour of television programs into seven seconds of storage time. The programs could then be broadcast to special videorecorders designed to store the programs in the compressed format. Later they could be played back by a viewer at the normal half-hour playing time.

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CENTRAL PIEDMONT COMMUNITY COLLEGE

From McIntosh's viewpoint, the technology would allow educational television stations to broadcast a large number of educational programs (over 500 half-hour programs in one hour) at off hours to students equipped with the special recorders. The students could then select the material they needed and play it back at a time convenient to their schedule. Thus, a full complement of college courses could be brought to anyone in the state with access to an educational station.

Because of the particular nature of the RTS technology, the primary format of the educational programs, at least in the beginning, needed to be slide/sound. McIntosh, knowing that a successful hardware system depends on good software, became involved with a national consortium of community colleges called ACCESS to develop material for the forthcoming RTS system. The consortium consisted of City Colleges of Chicago; Metro Community College in Kansas City; Lane Community College in Eugene, Oregon; Coast Community College in Costa Mesa, California; and Central Piedmont Community College.

This consortium successfully produced four slide/tape courses—on Consumerism, Child Development, Business Administration, and Mathematics.

However, during the summer of 1976, McIntosh looked at the production costs of the ACCESS programs and became convinced that faculty and staff members of North Carolina Community Colleges could be trained to produce the same quality of programs at a fraction of the cost.

McIntosh proposed that North Carolina support a project to produce material for the new technology. Several key state political leaders were contacted and subsequently endorsed the idea. State funding for the project was obtained through the efforts of Fred Manley (who became the state liaison to the effort). The North Carolina Rural Renaissance Project was begun.

Phase I

In its first year (September, 1976—June, 1977), the project was given $100,000 and a mandate to produce 60 adult-level learning modules in Occupational and Adult Basic Education, at a cost of $1667 per module. McIntosh recalls that at the time he had not done any careful analysis of module costs. Therefore, when he was asked for an amount he just pulled the figures of 60 and $100,000 out of the air. In the meantime, he hired Dr. Lynn Moretz as the first NCRRC director. It is a measure of Moretz's leadership ability and the consortium's enthusiasm that 62 modules were produced for this amount.

Beginning in July 1976, Moretz had the task of training module development teams at the ten participating community colleges, as well as leading them in the production and development of the modules. Based on Moretz's organizational model, each local institution selected a local coordinator to represent the institution within the consortium and to manage the local activities of the consortium within the institution.

A major activity for each coordinator was the selection of appropriate modules for the local institution to produce. Selection proceeded in the following manner: (1) The coordinator advertised on campus that the NCRRC was looking for module topics. (2) The coordinator evaluated the possibilities and selected a list of modules equal to the institutional module commitment (six in the first year). Before proceeding with production, the coordinator checked with other local coordinators, through the director, in order to make sure that there was no duplication of effort and that a quality, commercially-produced product covering the objectives of the proposed module did not already exist. (3) The coordinator then proceeded to contract with a local faculty member to produce a content outline of the selected module along with objectives, test items, and other related

learning materials. (4) The coordinator took the finished outline and saw to it that it was produced in the desired slide/tape format. The coordinator's involvement in the actual production process depended on his or her personal training and skills, with expertise ranging from an instructional designer background to video production training.

Phase II

Phase II (1977–78) was even more ambitious. One hundred and fifty thousand dollars were allocated to produce 80 slide/tape modules in Occupational and Adult Basic Education, a per unit cost of $1850. However, tragedy struck the project. Dr. Goldmark, still in the midst of developing the RTS technology, was killed in an automobile accident. His death meant that the ultimate goal of the consortium had to be modified to reflect changed circumstances.

The decision was made to continue the consortium efforts to produce adult-level learning materials. Gradually, the concept of using the production process as a method of training became as important a part of the project as the actual production of modules. A large number of community college people received experienced-based training in designing, writing, and producing a variety of logical, instructionally sound, adult learning materials.

Phases III-IX

In subsequent years, that is from phase III to phase IX (1978–85), the consortium experienced a number of changes. Funding increased to $216,000 in 1980–81, several schools dropped out, and others joined. The original director resigned to pursue other interests; and a second director, the author of this paper, took over. Module subject matter expanded from an exclusive emphasis on Occupational Education and Adult Basic Education (due to federal grants) to a policy of producing any adult-level material of interest to community colleges and technical colleges/institutes.

Several developments are worthy of special note during this time. For example, after a number of years of producing modules, it became apparent that a viable dissemination method was needed. Originally, a procedure was developed whereby each individual school ordered from another school directly. This approach did not work and was dropped for another approach, worked out by Moretz, that is still in use.

Under this plan, the Media Processing Services Section of the State Department of Community Colleges was designated as the central ordering

facility for all modules. All orders for previews and purchases of modules were directed to that office. Secondly, the home institution of the director, Central Piedmont Community College, was designated as the duplication facility for the consortium. CPCC retained the masters for all the modules and reproduced them at cost for orders received from the Media Processing Services Section. This system has worked well and continues today, with the only changes being that the functions of the Media Processing Services Section have been taken over by the Learning Resources Director, Mr. Fred Manly, the original and continuing state liaison with the project, and his staff.

Because of the increase in the number of modules available, the consortium had to develop a catalog of its materials. At present, this catalog, which is revised every year, contains over 300 modules.

A second development of the consortium was to widen not only the selection of modules but also the type of formats used to deliver the instruction. The consortium originally used only the slide/sound format. Gradually, the consortium began to use other delivery formats: audio notebook, videotape, and floppy disk-based CAI. At present, one institution, Central Piedmont Community College, is gearing up to produce a videodisc module. However, the viability of using this type of format will have to await further experimentation.

A third development is a testimony to the quality of the consortium's products. A commercial company, the Arthur Mokin Corporation, contracted with NCRRC to distribute some of its selected modules on a worldwide basis. Revenues from this contract revert to the consortium for further outreach purposes.

Conclusions

Several conclusions may be drawn from the NCRRC experience:

• *Conclusion 1.* The basic key to the effectiveness of a consortium is the quality of the people who assume the various consortium roles. One set of key roles within the NCRRC are those of the president, the local coordinator, and to a somewhat lesser extent, the supervisor of the local coordinator within each institution. Another set of key roles, at the state level, involves those of the state liaison, the consortium president, and the consortium director.

• *Conclusion 2.* NCRRC as a local consortium can and does produce quality, adult-level learning materials because of the collective experience gained over the last eight years, the numerous workshops and training

sessions engaged in by consortium participants, and the generally high level of education possessed by the people involved in the group.

• *Conclusion 3.* NCRRC does a reasonably good job of after-the-fact quality control. Each summer, it convenes for two days in the mountains of North Carolina to review an entire year's production. The review covers the technical quality of the production, the currency of the information presentation, and other related matters of quality.

• *Conclusion 4.* NCRRC, however, does an inadequate job of formative evaluation; that is, at the present time, there is no mechanism for consortium-wide review of modules prior to their release.

• *Conclusion 5.* The NCRRC consortium has suffered a loss of effectiveness at those infrequent times when local member institutions impose budget restrictions on participation and clamp tight restraints on consortium travel. Consortium members must meet and interact on a regular basis if the organization is to function as a true consortium of institutions.

• Conclusion 6. Sales of modules within the state have not been as high as was first anticipated. The market within the state is limited, and there has been a lack of aggressive dissemination efforts. The biggest reason for the less than desirable dissemination is that the consortium has not employed a strong statewide needs assessment process to determine what new materials need to be developed. Rather, production decisions have been dominated by the needs and desires of local institutions. It is probable that dissemination will increase when the consortium begins to produce carefully developed adult-level courses that are based on widely perceived needs.

The Future

North Carolina still has a large number of distant learners. They range from rural adults hampered by driving distance to city dwellers whose jobs or personal circumstances prevent them from enjoying the access available to the regular adult community college learner. The North Carolina Community College System desires to facilitate their access to quality, wide-ranging adult-learning opportunities.

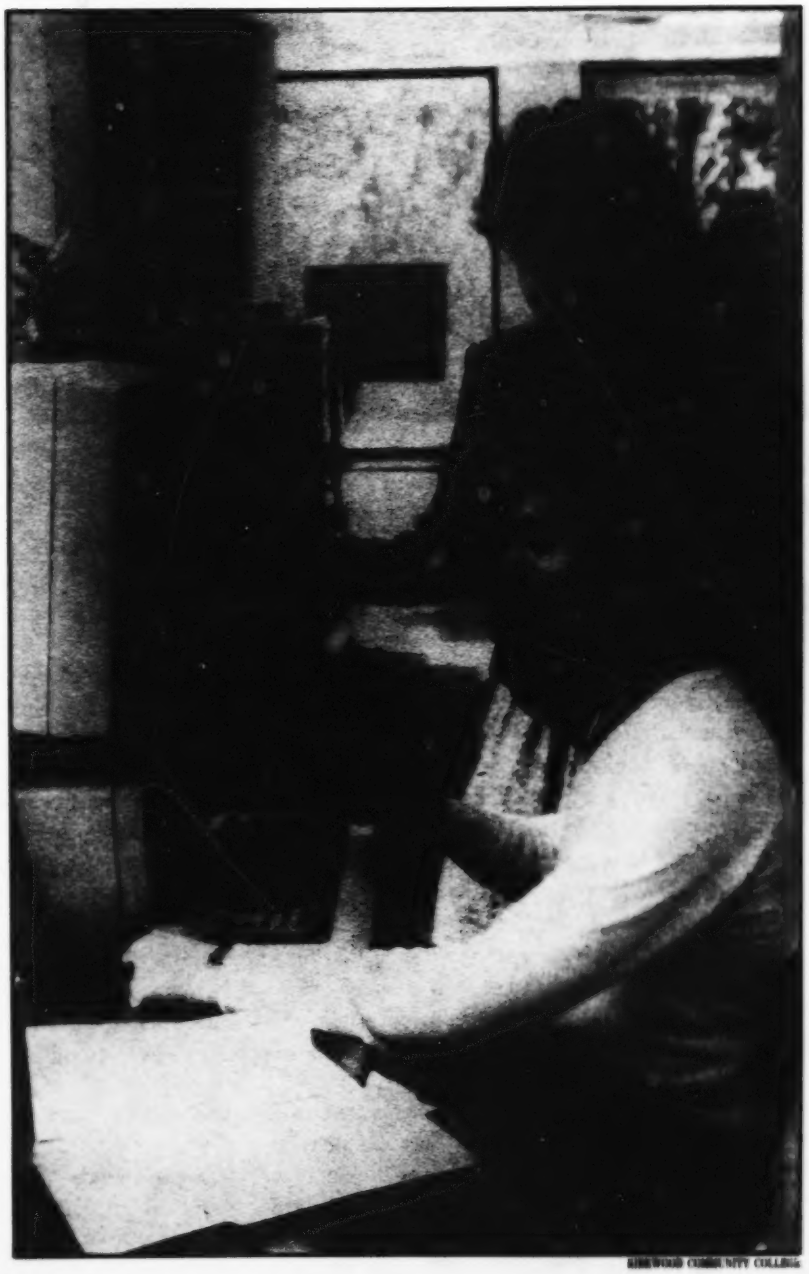
In the near future, NCRRC will have the opportunity to fulfill the Goldmark vision with the aid of new technologies. Following are recommendations for future action:

• The consortium should move away from individual school decisions about module development, replacing that approach with a consortium-wide decision system. Related to that move, the consortium should develop complete courses based on well-done needs assessments.

CENTRAL PIEDMONT COMMUNITY COLLEGE

- The consortium should move toward becoming a system-wide catalyst for experimentation with high technology solutions to distance learning problems.
- The consortium should continue to sponsor statewide staff/faculty development workshops in the area of media hardware and software, with an emphasis on making high technology workshops available in-state on an affordable per attendee basis.
- The consortium should keep a core of highly committed, interested schools as lead institutions. These schools would receive funding from the consortium based on their prior levels of commitment to projects, activities, and coordinator travel.
- Additional schools within the state should be invited to join the consortium. These new members would be eligible for courseware development grants, workshop scholarships for participating faculty, and participation in other specified consortium activities.
- The consortium should actively pursue joint ventures and seek out grants, to expand its activities as a distance learning facilitator.
- The consortium should develop a sharing system whereby educators within the state could share their materials with others. Included in that strategy would be a method of rewarding these people through royalties or grants.

If some or all of these suggestions were fleshed out and implemented, NCRRC could fulfill its founders' dream of providing quality access to adult learning for all North Carolinians. The impact of such a dream on industrial recruitment, quality of life, standard of living, and personal satisfaction would be inestimable.



EDUCATIONAL ACCESS CABLE: The Telecommunications System at Kirkwood Community College

by Richard Gross

Important as its agriculture is to the nation, Iowa is also a setting for high technology and social and educational innovation. Education, in fact, has such a high priority that the state leads the nation in adult literacy. The farmer who is busy in the field during the day may very well sit at the family computer at night or drive to the nearest high school to take part in a live interactive video or audio college credit class originating miles away.

Iowa, in fact, is a leader in the innovative use of educational technology. Nowhere is that leadership more apparent than at Kirkwood Community College in Cedar Rapids, developer of a comprehensive educational delivery system known as KTS, the Kirkwood Telecommunications System.

The Kirkwood Telecommunications System

Kirkwood Community College is the public community college for a district that includes seven counties and covers 4,300 square miles. Except for the larger communities of Cedar Rapids and Iowa City, the area is

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predominantly rural, with a population of about 350,000 people, two thirds of whom live in the Cedar Rapids-Iowa City vicinity.

From Kirkwood's earliest days there has been a commitment among administration and faculty to the use of educational technology to enhance the teaching-learning process. For example, Kirkwood began its video production services in the early 1970's to provide its faculty with supplemental instructional resources. Typically, a faculty member would arrange to have a mini-lecture, a demonstration, or a classroom example videotaped. The resulting short, single-concept tapes could then be viewed by students on their own time, freeing faculty for more one-on-one interaction in the classroom or laboratory.

At the same time, a method of delivering video material was developed that also freed the instructor and students from handling video tapes or operating VCR's. A closed-circuit, "demand-access" cable system was installed, allowing video titles to be called up by telephone from a central video library and delivered via cable to receivers located in laboratory, library, or classroom facilities.

This system has grown over the years and now includes over 4,000 video tape titles and a 36-channel internal cable system. Demand can exceed 800 tape plays per day. In 1984, the system serviced about 46,500 requests for video playbacks.

Video production services have also expanded. Kirkwood is producing self-paced telecourses. In 1985, it finished a three-course accounting sequence.

With the development of telecommunication-based services on its main campus, Kirkwood began to look for ways to use this technology to expand services to students off campus. Since Kirkwood's service area is so large, almost 100 miles from north to south and 80 miles from east to west, administrators and faculty were aware that many people might not have an opportunity to commute to classes. Also, because the number of students involved would be small, Kirkwood could not, at reasonable cost, provide a comprehensive curricula of face-to-face classes at remote sites.

The eventual solution involved the development of the Kirkwood Telecommunications System, a comprehensive telecommunications network that employs three different delivery technologies. They provide both live and interactive instruction: point-to-point microwave and ITFS.

Point-to-Point Microwave

The first component of KTS, which began in 1980, consisted of several

point-to-point duplex microwave links (Telelink). Each link is capable of simultaneously carrying video and audio signals in two directions. This enables an instructor to be in visual as well as aural communication with students at other sites. Instruction also can originate from any site.

As of 1985, Kirkwood had five origination facilities on its main campus and seven origination classrooms at remote sites for the Telelink Network. At least one remote site is located in each of the outlying counties, in a centrally located community. As a result, it is now a fairly short drive from any location in the service area to a KTS telelink classroom.

The system operates through an independent 12GHZ duplex microwave link between the Kirkwood campus and each of the seven remote sites. Because each link is independent, different programming can be supplied to or from each site. Switching is handled by a computer-controlled master console, located on KTS master control on the main campus.

The use of this technology also allows Kirkwood to add as many as 12 additional voice/data grade circuits between each site and the main campus without affecting the primary two-way video/audio service. In this way, the college can tie together its off-campus and on-campus MIS network, allowing computers at the off-campus site to be in communication with the on-campus mainframe or other personal computers. Kirkwood also maintains its own private telephone network between these sites and the campus, thus saving the cost of WATS or FX lines.

Each originating classroom on the telelink network is functionally identical. Rather than resembling a television studio, which could be inhibiting to students and faculty, the facilities are designed as classrooms. Two cameras are used in each classroom. A front camera with a wide-angle lens provides a view of the students; a rear camera provides students with a view of the instructor, white board, and other teaching media employed at the front of the classroom. A camera operator is present at whichever site is being used by the instructor. He can access any of the front cameras, using a passive switcher to allow interactive video between the instructor and all sites participating in the class. Students use "push-to-talk" microphones for interactive voice communications. Students at non-originating sites watch the instructor on one of two monitors mounted in each classroom.

The systems works like this: Master control establishes the network, that is, the group of sites to be joined together for a particular class. Control is then passed to the camera operator, who manages all interactive switching between those sites for the duration of the class. Control is then

passed back to master control to set up the network or networks for the next class period, and so on.

Telelink now operates 70 hours per week, from 8 a.m. to 10 p.m., Monday through Friday. The primary use of the system is to provide college-credit instruction, although noncredit and continuing education courses are also provided. (It is possible for a student to earn an associate degree entirely from the curricula provided over Telelink.) Thus far, Kirkwood has been encouraged by the fact that enrollment over the system has increased each year since its introduction.

Instructional Television Fixed Service

The second component of KTS involves the use of a technology called Instructional Television Fixed Service (ITFS). ITFS essentially is a low-power broadcast technology; that is, the broadcast signal moves away from the transmitter in a more or less omni-directional pattern. Special antennas are placed within line of sight of the transmitter to pick up the signal. Since this technology, like conventional television, is a one-way system only, Kirkwood places small radio transmitters at the receive sites in order to provide for interactive audio traffic. The ITFS signal can be conveniently received, depending upon surrounding terrain, within a radius of 20–25 miles. Kirkwood has four ITFS origination channels at the main campus.

The college developed an ITFS system, in addition to Telelink, to respond to a set of local needs that could not be addressed solely by Telelink. Kirkwood wished to work more closely with the more than 30 public school districts, many of which are small and rural, in the service area. The technology, which is less expensive to install at the receiving end than Telelink equipment, is used to provide shared high school programming to these districts, as well as to present college credit instruction to select high school juniors and seniors.

Since many of the districts are located more than 25 miles from Cedar Rapids, Kirkwood installed special repeater/transmitters on the existing telelink towers at the remote sites. This equipment picks up the ITFS signals from Cedar Rapids and retransmits them. In this way, the college can cover most of its service area with ITFS transmissions. Like Telelink programming, ITFS programming is both live and interactive. Interaction, however, is limited to audio only, because there is no return video signal from the ITFS receive site.

As of 1985, 17 school districts, as well as a state prison facility, were participating in this service. The daytime schedule includes a half day of

shared high school instruction. High school course offerings are determined by the participating school districts acting as a consortium. The remaining half day of daytime programming provides a schedule of selected college credit courses. Some school districts see these courses as augmenting their gifted and talented or honors programs. During the evening hours, programming includes both college credit and continuing education courses which attract primarily older community residents.

Routing and control functions for ITFS are handled by the KTS master control facility. In many instances, the resources of both ITFS and Telelink are combined. For instance, if a high school teacher recruited to present one of the shared high school courses lives some distance from Cedar Rapids, he or she will simply go to the nearest Telelink site. This signal will be used to import the instructor's video and audio to Cedar Rapids, where the signal will then be transmitted out to the school districts on an ITFS channel. In other instances, Kirkwood has linked both systems together for a combined course or special event.

A second ITFS school service was inaugurated in the fall of 1985 with the advent of a Cedar Rapids urban network. This network links the facilities of the Cedar Rapids school district. A third service is being developed that will provide both in-plant instructional services to business and industry, as well as providing additional public service programming.

A fourth ITFS channel is used to interconnect the Kirkwood cable television service to several outlying community cable systems.

The Kirkwood Cable Network

Kirkwood currently operates a cable network reaching about 45,000 homes in eight communities. The cable network is programmed from 7 a.m. to 10 p.m. daily from KTS master control and runs a billboard message service overnight. The primary service offered over the cable network is a program of credit and noncredit telecourses. Each telecourse program is repeated several times during the week to provide maximum opportunity for student viewing.

Additional cable services include Kirkwood local programming, produced by Kirkwood Student Productions, as well as general educational and informational programming obtained, by permission, off a satellite or through "bicycle" program services.

Kirkwood currently works with three cable systems in scheduling its service. Programming is delivered to the head-end of each system via an ITFS broadcast channel at the Kirkwood campus. The college is currently

negotiating with additional cable operators for expansion of this service into additional communities.

During the development and operation of its cable network, Kirkwood has learned a number of valuable lessons.

Suggestions for Operating an Educational Access Channel

1) *Establish the purposes and priorities for the cable channel.* One should assume from the beginning that different people at an institution will have different purposes in mind. Some will see the channel as a way to deliver instruction to the home; others may see it as a public relations vehicle; still others may see it as a creative outlet for media and fine arts students. All these views are valid, and the programming day is long enough so that all of these purposes can be served and still leave the program manager searching for additional program material.

At Kirkwood, the educational telecourse schedule runs about 40 hours per week. Live and recorded Kirkwood speakers and special events, produced by students, occupy about five or six hours per week. Kirkwood promotional material runs overnight and from noon to 1 p.m. This still leaves about 40 hours per week of schedule to fill.

The imperative is involvement. The operation can best earn continuing campus support by involving faculty and staff early in the planning stage. They will then have a stake in its success. Campus-wide involvement also helps to establish both accountability and credibility for the channel and may help to identify potential resources for its operations.

2) *Get to know the general manager of the cable system.* That person is probably only fulfilling a franchise obligation by allowing the college access to a channel. Use that realization to your advantage. Do not start out with the attitude that the manager owes the college something. Also, do not make grandiose promises about how lively the college's channel will be. Managers have heard that before. The track record of local access programmers, frankly, is not good. Rather, supply a manager with timely information about the channel and it's programming. If someone writes the college a complimentary letter about the channel, send the manager a copy. Allow the manager to share in the success of the channel. As in most other enterprises, the little things do count.

3) *Establish operational limits early and learn to live with them.* A high-quality cable channel is possible on a shoestring budget. Other than for telecourses and local student productions, Kirkwood does not have a separate budget for cable program acquisition. Yet the college has managed

to acquire the rights to quality material, much of which is exclusive in its market. Explore alternative sources of funding. Local grants and contracts, as well as program and channel underwriting, are all possible given time and creativity.

4) *Get to know program suppliers.* Searching for available program material involves as much hard work as any other research project. There is no single source of program material available. Kirkwood has used government catalogs, library resource materials, and many other means to identify usuable programs. In some cases, likely programming is identified on satellite, and air rights are obtained through a call to the producers. When attempting to secure rights, Kirkwood has found it best to use the telephone, followed by a letter, rather than just a letter itself. In this way, personal relationships can be developed with program suppliers that may pay off with additional programming or more flexible rights in the future. The college relies on material obtained this way to fill about 40 hours of its total schedule per week—and with just an acquisition budget. Material includes "how-to" programs, discussion programs, PBS prime-time programs, classic movies, news and sports programs, and other quality programming.

5) *Set a monthly schedule early and do not change it.* Viewers rely on a printed program guide. Kirkwood has its daily cable schedule printed in local newspapers, supplying them with a monthly schedule that includes a brief phrase or sentence describing each program. The monthly program guide is completed by the 15th of one month for the next month, a deadline consistent with the newspaper deadlines. Once a schedule is set, there should be few, if any, changes during the month.

6) *Remember that educational access cable is "narrowcasting," not broadcasting.* Because the audience is smaller, it is possible to program to selected targets. For example, Cedar Rapids is home to several aerospace industries. During a recent space shuttle fight, the college obtained permission from NASA to use its Houston Control satellite feed. A week or so after the flight ended, the college received a thank-you note from one company, signed by well over 100 of its employees. While that number is not a significant percentage of the area population, it nevertheless showed that the service provided important information in a timely fashion to a specific target group. This type of service is unique to the narrowcasting concept.

7) *Develop methods to provide ongoing internal communication about the cable channel.* Faculty and administrators should be among the first to receive program schedules. An instructor may want to have students

watch a certain program. Involving faculty and staff in program selection, when possible, and providing timely information to them about the program schedule helps assure good internal relations.

Do not overlook "co-marketing" arrangements. These can take many forms. For example, if the channel is running a contemporary noncredit series that may have a companion book, obtain rights to market that book in the college bookstore and advertise its availability during the series. If the college is running community education programs, look for possible ways to tie relevant video materials to them. The instructor will encourage students to view the programming on cable, while the cable service can advertise the community program to other cable viewers.

8) *As the library of available program material grows, explore ways to reduce program "seams," that is, intervals between programs.* Viewers are more likely to tune in to a narrowcasting service for specific subject matter rather than for variety. One way to capitalize on this is to run similar materials during programming blocks. For example, lead and follow a science telecourse series with general interest science programs. A viewer who tunes in because of the general subject matter may follow the entire telecourse and become a future credit student.

Also, consider the needs of potential audiences and build a schedule according to who is likely to be viewing during different portions of the day. An accounting telecourse, for example, is more appropriate in early morning, evening, or weekend time slots rather than during normal working hours. A series about gardening is more appropriate during the spring than during the fall.

9) *During the early stages of cable development, establish procedures for handling problems and programming errors that surely will occur.* For example, a telecourse segment may not run on time or may be run out of sequence. Definite procedures for notifying students and routing complaints should be established so that when a problem does arise, operators and others have guidelines to determine corrective action. This is much more productive than panic or scapegoating. The important point is not to assume that "this will never happen to us."

10) *Develop and maintain good relations with local cable commissions.* As guardians of the cable franchise, they want to see access programming succeed. Attend their meetings and provide regular reports.

Cable in Summary

The Kirkwood Cable Network is an important component of the

Kirkwood Telecommunications System. While the Telelink and ITFS networks each provide a full schedule of live credit and noncredit classes to selected sites, the cable network is the video link to the home. In addition to its credit telecourses, cable also provides a wealth of public relations. It allows the home viewer more than an occasional glimpse of what is going on at the college that tax dollars support.

The Kirkwood Cable Network and the college's public radio station, KCCK-FM, are both provided as public services. While the college cannot claim that these are perfect services, it hopes that it has demonstrated at least that informative and enlightening programming can be provided on a modest budget.

WAUBONSEE COMMUNITY COLLEGE

TELEVISION: A Computer Course by TVOntario Academy*

by David Walker

The Ontario Education Authority is a nonprofit corporation that operates a telecommunications system known as TVOntario (TVO), providing the people of the Canadian province of Ontario with ways to learn. The system is centered on a television network.

The province it serves has a population exceeding eight million. Although the total area is over one million square kilometers, most people live in southern Ontario, an area that makes up less than a third of the total area. Mother tongue for 78 percent of the population is English, 5.5 percent French.

The official mission of TVOntario is to utilize electronic and associated media to provide educational opportunities for all people in Ontario, where the use of such media will complement the educational opportunities being offered by other agencies, or alternatively, will provide educational opportunities not otherwise available to such persons, and further to cooperate with other organizations in attaining social and educational goals. As this implies, TVOntario has social, individual, and interinstitutional concerns.

David Walker was Executive Director, TVOntario.

*Also involved in the production of this paper were Caroline Gray (print and guides), Danny Leung (graphics), Dennis Murphy (underwriting), Don Robertson (utilization), Lee Robock (finance), Donna Sharon (development research), David Stansfield (television), Bob Switzer (marketing), and Judy Winestone (software).

TVOntario Academy

One activity of TVO, a distance-learning project in two languages, has spread through North America within two years and has begun to enter Europe. This project grew out of a new idea in adult learning, the TVOntario Academy, that started in early 1980. The TVOntario Academy is built around the following elements: television broadcasts, a computer-managed learning system, and specially-designed course materials.

Course materials other than television programs consist typically of a learner's guide; reading materials (usually a collection of essays written specially for each project); multiple choice questions designed not so much to evaluate as to encourage an active exchange between the academy and its participants; a computerized learning management system that enables TVO to write responses to those who ask questions; and newsletters that enable participants to exchange experiences.

The system was carefully evaluated in the offering of such subjects as "Health and Environment," "The Music of Man," and "Parenting;" and it was found that TVO is a successful example of the educational and instructional capabilities of television broadcasting. Further, the system demonstrates that truly interactive programming does not always need intimacy: two-way real-time cable, telephone, or satellite circuits are not the only ways to obtain interaction.

TVOntario is the one educational agency that:

- offers home study to people whose educational choices are limited by distance, work schedules, personal circumstances, and the number of courses available elsewhere;
- allows learners to control their activities by determining personal objectives and selecting appropriate learning materials, evaluation procedures, and modes of interpersonal exchange;
- provides a variety of learning materials adaptable to individual learning styles; and
- uses each delivery system in appropriate educational ways, taking advantage of unique features of the media.

Computers in Education: "Bits and Bytes"

These features made officials confident that TVOntario had great potential for diffusing computer literacy not only among teachers but also to the general public. It was in the area of teacher education, however, that TVO saw an opportunity to act in 1981. By then, personal computers were appearing in small businesses, homes, and some schools. The TVOntario

response to growing public interest in their capabilities was the TVO Academy on Computers in Education, organized around a series of 12 televised programs called "Bits and Bytes."

The Office of Development Research considered how the TVOntario Academy adult learning concept could be applied to teaching microcomputing to educators and others. It also gathered information about microcomputers currently used in schools, assessed the interest of school boards in supporting teachers involved in such a program, identified sources of educational software, determined how it was being used, and asked teachers using software what areas needed software development.

TVOntario's officers realized that the information to be conveyed by the studies would be useful to both the public and private sector. These studies, once published under the TVOntario name, would also signal TVO's own interest in the field.

Designers, however, had to spell out how the academy format could be used in a computing academy on TVO television before the needed resources could be determined. The Minister of Education also made it clear that TVO was going to undertake this project on its own by finding new sources of money. If school boards, teachers themselves, and possibly software industries interested in educational marketing were to be the sources of financial support, they would have to understand the project clearly before production began. It seemed a paradox: understanding had to precede a project which would produce understanding.

Nonetheless, the problem was tackled. The design descriptions of the program elements of the academy were circulated to a wide constituency. Criticisms and suggestions were taken into account in the subsequent circulation of the proposed plans.

Overall content and the presentational method were to be addressed primarily to elementary and secondary teachers, most of whom could be assumed to possess undergraduate degrees but no background in computers. A secondary target would be parents of school-age children, a third the general public. The program had to be convivial and non-threatening in tone and approach.

The format would be a 12-unit, multimedia course, combining television programs; a study guide; basic and elective reading materials; hands-on experience; and a computer-managed response system (CML) providing individualized advice, diagnoses of encountered difficulties, and evaluation for each unit.

The topics of the units were identified as follows:

- computers in education;

- types of computers;
- functions and components of a computer system;
- commonly-used microcomputers;
- peripherals;
- computer-assisted learning (3 units);
- programming (3 units); and
- computer communications systems.

The weekly television programs would serve as both conveners and pacers. They would introduce topics, illustrate difficult-to-visualize operations, and lead always to culminating hands-on experience. The programs, if viewed after completion of each unit, would reinforce and sum up main unit themes. It was anticipated that a participant would spend up to three to six hours weekly reading, completing exercises, working in computer laboratory situations, and answering questionnaires. From its base of "no knowledge assumed," the content would move on to more advanced topics. Overall emphasis was to be on the educational objectives achieved with computing.

The following proficiencies were expected among learning outcomes:

- the ability to operate a microcomputer;
- a familiarity with the functions and components of a computer system;
- an understanding of the capabilities and limitations of commonly used microcomputers;
- an awareness of the different forms of a computer-managed response system;
- a familiarity with teaching materials in a variety of fields;
- an ability to select materials for own use;
- an ability to read and modify existing programs;
- an ability to develop simple computer programs; and
- an ability to do basic trouble-shooting.

Units would contain sample computer programs or require programming assignments on computers commonly available. CML and its prescriptions would be employed to suggest additional learning materials for academy participants who wished to take maximum advantage of the course. Responses to this design model from 125 school boards justified an estimate that as many as 10,000 teachers would register.

At this point, TVO managers asked for a detailed cost projection. They agreed that the climate was right for the academy, but they wanted to know what it would cost and how it would be financed. After all, producing an "academy" disrupts normal activities. It was estimated that 25 per-

cent of TVO's 400 employees would be engaged in establishing the computing program.

Raw resources, types of labor, procedural steps, and facility and space requirements—all were incorporated into a tentative budget. Expenses were divided between one-time (or developmental) costs and ongoing costs. Expenses were also divided into fixed costs and variable costs (which would change with the number of registrations). Estimates of cost ranged as high as $1,100,000 for a one-time presentation with an enrollment of 10,000. But costs fell below $80,000 with an enrollment of 10,000, if private sector support could be found. It was also expected that there would be more than one run for the academy and that some of the elements could be incorporated into other learning systems, which would lower costs even more.

Parallel situations in other Canadian jurisdictions and in the United States gave reason for optimism. Basic computer literacy programs were finding markets. For the moment, however, planners did not consider a version for the French-speaking market. Terminology and management problems did not make this feasible.

Video Development

Management decided to start development of the academy in January 1982 working with TVO's Part-Time Learning Branch. People from several branches formed a task force and worked under a project leader. The task force had two principal functions: the production of television and print packages, and the creation of a utilization scheme to deliver the whole. The original target release date was the fall of 1982, but developers soon realized that schools are too busy in the fall to involve many teachers in a course of this kind. The release date was therefore moved back to February 1983.

The leader concerned with production of television and print elements started off with highly-developed outlines for the academy units prepared by Development Research. He tried again and again to turn these into television. But "overviews" and "outlines," no matter how well developed, do not make programs that will catch and hold the attention of adults in a media-rich market. He decided, therefore, to find out what the research said people need to know about microcomputers, the sequence in which they need to know it, and the sort of people adults like to learn from. He and his director had to start with such basic matters as showing people how to turn a computer on and how to load software into the computer using a cassette (the commonest software medium at the time). They also had to challenge television actors to motivate an unseen audience.

The fact that computer information is in binary code led to some theorizing about *bits* and *bytes*. Animation emerged as an ideal presentational technique. It also became apparent that there is a need for breathing spaces in the midst of all this concentrated instruction. The team therefore invented a "mini-documentary" which dealt with actual applications of what had been discussed. In other words, the production teams always looked at things from a participant's perspective. Participants are satisfied when they can ask what they need to do and know next in order to get immediate and concrete use from a micro. This logic, quite different from the logic of print presentations, determined all the rest of the 12 programs in the "Bits and Bytes" series.

Five months before the first broadcast, the programs underwent formative evaluation. A program evaluation analysis computer was employed to record the reactions of a sample audience every five seconds on a three point scale. A group of teachers representative of the teachers expected to enroll in the academy found the programs interesting and at the correct level for a majority of teachers. They expressed, disapproval, however, of the actress, who was seen as impersonal and somewhat authoritarian.

Changes were made. For example, sequences were reshot with two actors in settings that encouraged better communication between instructor and learner. Documentary sequences that did not win approval were re-edited and shortened.

After revision, the television program content was as follows:

Week 1: "Getting Started." How to load cassettes and disks; the meaning of bits and bytes and "k"; computer logic.

Week 2: "Ready-made Programs." Range of software; speed of the computer; differences between ROM and RAM.

Week 3: "How Programs Work." GOTO; history quiz; basic elements of the computer: input/output, CPI, memory.

Week 4: "Storing Information." File manager; formatting; file; record; field.

Week 5: "Communication Between Computers." Modems; bulletin boards; large databases; network controllers; three types of network.

Week 6: "Computer Languages." Differences between BASIC, APL, COBOL; experiments with LOGO; translators, interpreters, compilers.

Week 7: "Computer-Assisted Instruction." Limitations of AI; elements of good CAI; differences between drill and practice and tutorials.

Week 8: "Simulations and Games." Paddles, joysticks, analog, digital, "booting DOS."

Week 9: "Computer Graphics." Plot, VLIN; graphics tablets and

packages; meaning of terms hi-res, lo-res, pixel, bit-mapping.

Week 10: "Computer Music." How to turn a computer keyboard into a musical keyboard; how to use music and voice synthesizers.

Week 11: "Computers at Work." Word processing; the electronic spreadsheet; process control in education.

Week 12: "Review."

Print Materials

Production was delayed when it became clear that the content sequence of the television programs would be the sequence for the whole learning system. Other elements of the research plan—e.g., the hands-on manuals to help participants to deal with particular brands of computer—were written, field tested, and developed concurrently with television development.

Once the content of each of the television programs was determined, production started on a *Participant's Guide*, an *Educational Applications Handbook*, reading materials, and questions. (After the first run, changes were made. For example, the hands-on guides were expanded and French-language materials were produced). Sample educational software programs (drills, simulations, tutorials) were also developed.

Both print and software were evaluated and modified. Software cassettes were particularly troublesome, with 40 percent failing to win evaluators' approval. Accordingly, the programs were subsequently distributed only on disk, and the pedagogical quality of the programs was improved.

As for CMI programs, first used by TVOntario in 1979, they were based on the Miami-Dade Community College RSVP software. The Academy on Computers in Education employed the CMI to provide:

- individualized advice;
- a diagnosis of encountered difficulties;
- evaluation; and
- an opportunity for participants to receive additional resources matched to special interests/concerns.

The learner is expected to complete and mail in multiple choice questionnaires at scheduled intervals during the broadcast period. For every completed questionnaire, the learner received a personalized response letter.

Utilization Plan

The utilization scheme centered on getting some of the 88,000 teachers in the 5,000 provincial schools to sign for the course.

Every teacher in Ontario received a brochure. A special videotape was shown at promotional sessions organized for trustees, officials, and community opinion leaders. The Ontario Teachers Federation paid for a mailing to its members. The Ministry of Education issued a numbered memorandum recommending the academy to all its officials and schools. Many community colleges organized to offer time in their computer laboratories to local participants. Educational institutions received videotape recordings at subsidized rates.

The "Bits and Bytes" television programs were distributed by Anik B satellite to the 14 high-power TVOntario transmitters and 40 low-power stations. Each program was followed by an additional half-hour designed to increase the visibility of the academy in the intensely competitive Ontario television markets, to share answers to participants' questions with the entire group, and to reinforce the educational perspective by featuring teachers as experts and guests each week.

Revenues Generated

Discussions started early on with some 60 corporations asked to help pay for the academy. (It had already been decided that participants who registered for the full course would pay $59 each.) In return for corporate contributions, TVOntario would give a five-second credit on each program. Six equipment manufacturers or distributors, provided $92,500.

The English-language version of "Bits and Bytes" has been sold to the Departments of Education of other Canadian provinces. It is also shown on regional networks in the Maritime Provinces and British Columbia. Some 50 American markets make use of the academy, through Station WNET, New York. Time-Life, Inc. has distributed the materials to industry, institutions, and governments. VisNews and TWT will distribute the series internationally. A French version, "Octopuce" has been sold to Belgian Radio et Television. In fact, all costs have now been recovered.

Evaluation

How were the learning objectives met? The completion rate has been good by adult educational standards. The first showing in Ontario saw 35 percent of registrants completing the course.

Enrollments have been high. So far, in Canada and the United States, there have been more than 50,000 paid registrants. During the first broadcast by TVOntario, a total of 170,600 viewers watched each week. Extra-

polation throughout North America has yielded an estimated three million viewers for the series to date.

Summative evaluation instruments sought information about the participants (demographic traits and degree of satisfaction with the academy), investigated the extent of their learning as perceived by participants, asked about actual use of course components, and solicited suggestions as to how components could be improved. Responses produced valuable information, some of which has been used in revising elements of the course.

Following are some highlights from the evaluation:

- 43 percent of the registrants were elementary school teachers.
- 60 percent felt the pace of the Academy was "just right" for them.
- 76 percent felt the Academy was worth the cost.
- 90 percent said they would recommend the Academy to other teachers.
- 60 percent watched 10 or more of the television programs; 30 percent watched all.
- 85 percent read the participant's guide and reported they were satisfied with it.
- 39 percent returned all three CML questionnaires.
- 69 percent said they were satisfied with the CML component.
- 78 percent opted to use the elective hands-on component.
- 59 percent of those who received software did not use it, largely because of incompatibility, lack of time, etc.

While developing the Academy on the Computer, TVOntario staff had ample occasion to think a lot about the impact of new technology on jobs. Their reflection has prompted planning for two new series; "Future Work" and "Office Automation."

MERCER COUNTY COMMUNITY COLLEGE

SATELLITE:

The "Learning System" in British Columbia

KATHLEEN FORSYTHE

by Kathleen Forsythe and Valerie Collins

British Columbia is the third largest of the Canadian provinces, having a population of approximately 2.75 million distributed over an area of 948,544 square kilometres. Almost 60 percent of the total population is concentrated in the southern coastal areas of the Mainland and Vancouver Island, close to the United States border. There are some pockets of high density population in the central interior valleys, but much of the extensive territory of B.C. is unpopulated wilderness.

It is a challenge to the educational system of British Columbia to provide learning opportunities for the 40 percent of the province's inhabitants who are scattered over immense distances, isolated by the physical barriers of mountains, sea, and extremely harsh weather conditions. It is an even greater challenge to ensure that the education provided is not of inferior quality to that enjoyed by city-dwellers. Those people involved in distance education pursuits in British Columbia believe that the physical barriers to postsecondary education have been overcome, and that the educational courses offered are of equal quality (in some instances, superior quality) to those offered in a campus environment.

Historical Context

Since the 1920's, British Columbia has sought new and better ways bring educational opportunity to the learners at a distance, but the "Learn-

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ing System" that is now in place in British Columbia really developed over the past 13 years as the result of a series of changes in government policy and educational philosophy and the creative initiatives of several key individuals.

The period from 1972–75 saw keen interest in an educational decentralization and means to achieve it. Reports were commissioned on a communications policy, and the Open University model was investigated. However, the College Task Force Report of 1974, "Towards the Learning Community," really set the stage by 1) describing how colleges could be regional centres and 2) by promoting nontraditional approaches for four new colleges. Only one of these colleges, North Island College, fully accepted the challenge and established itself as an open learning system using a learning center approach with no central campus. This was the first full nontraditional "model" to emerge.

The Report of the Distance Education Planning Group on a Delivery System in Distance Education in British Columbia, which appeared in 1977, stressed the need for more distance education programs in the province, particularly in community education, basic education, and vocational training. The primary goal of the proposed delivery system was to provide distance education. A secondary objective was to provide the basis for a province-wide communication system which should be coordinated, flexible, multi-modal, and interactive. Further, the report recommended the establishment of a new institute or agency to assume provincial responsibility for the delivery of distance education in the province. Thus the report played a major role in the subsequent development of the Open Learning Institute (1978) and the Knowledge Network (1980), each of which carries out some aspects of these functions, one as an institution, the latter as a telecommunications network.

The last major report to appear in the 1970's was a study, *Link of Institutions for Video Education: 1979.* Its major recommendation was that the provincial government should set up an interactive television microwave network to provide increased access to educational programs. It was proposed that the teaching hospitals in Vancouver be linked to the University of British Columbia and that the law courts in Vancouver and Victoria be linked to the network. Such a network would enable a sharing of programs for professional development. These kinds of services are currently being supplied by the Knowledge Network's subsidiary, Knowledge-West, using a broad-band cable network service.

The technology to make all this possible appeared in the late 1970's. Canada's Anik-B satellite, launched in 1978, was designed to bring about

the transition from experimental to operational satellite systems. Located in geostationary orbit 26,000 km above the earth's surface in approximately the same area as Hermes, this satellite was the first to provide channels in both the 6/4 Gz and the 14/12 Gz spectrum. This allowed the exploration of the use of small, relatively inexpensive earth stations that had begun with Hermes and continued with Anik-B. Experimentation with Anik-B has been extensive. It has been used by Ontario and Alberta, as well as British Columbia's Knowledge Network, for delivering their distance education programs. In 1982, the Knowledge Network transferred to Anik-C, a KU band satellite.

Whereas the 1970's were a time of both critical questioning and the emergence of new technologies, the 1980's have been characterized by new forms of organizational relationship and changes in the teaching/learning environment made possible by technology. Many forces are at play, not least of which is the emergent concept of the "Learning System" as the "meta-organizing" principle for the delivery of adult learning by all the province's institutions of postsecondary education.

Since 1980, the concept of the "Learning System" has meant increased collaboration among institutions as well as a growing involvement in nontraditional methods of educational delivery. The main challenge of the "Learning System" is delivery, which involves creating many interwoven networks, such as communications, administration, and instructional systems that are flexible and responsive to students.

Current Situation

In 1984, the first formal consolidation of the emergent new system began with the creation of the Open University Consortium of British Columbia. Comprised of five members—the University of British Columbia, the University of Victoria, Simon Fraser University, The Open Learning Institute, and the Knowledge Network—the consortium makes it possible for students to combine both classroom-based and home-study courses from all member institutions in order to obtain a recognized university degree—the "Open Degree."

Although traditional models still dominate the teaching/learning environment in British Columbia, all the elements of the continuum necessary for the lifelong learning systems are not in place. Fragile in both budget and institutional commitment though it may be, the emergent system in British Columbia draws strength from the widespread involvement and the diversity of the approach. It has the requisite variety to become a viable

system, however, the "Learning System" is not yet formally mandated as a separate institution. Rather, it is a conceptual framework for the organizing principles that the institutions have chosen to use as they explore new ways to cooperate and new ways to use telecommunications to alter their teaching/learning environments.

British Columbia's three universities are all situated in the southwestern coastal corner of the Province. The University of British Columbia (UBC) and Simon Fraser University (SFU) are located in Vancouver, and the University of Victoria (UVic) in Victoria. In addition, the postsecondary system has 15 two-year regional community colleges and seven specialized provincial institutes. At least two (North Island College and The Open Learning Institute) use learning systems and distance education exclusively, and all of the others are involved in some fashion with the "Learning System" either through provision of learning centres or through course support for telecourses offered through the telecommunications network.

Through the organizing principle provided by the Knowledge Network, all 15 colleges, three universities, and four institutes are involved in distance education, using satellite delivery that can currently be received by 85 percent of the province's population.

The organizing principle of cooperative individuality as applied by the Knowledge Network permits individual and local participation by institutions and provides a forum for provincewide cooperation to solve common problems associated with educational delivery by telecommunications. The cumulative effect of this system, which links individual and communities technologically and institutionally, is different than that of a detailed centrally controlled system.

This new system offers a logical and efficient way to deal with the perennial centralized vs decentralized debate that has dominated the history of postsecondary education in this province by accepting that both points of view are essential to a successfully functioning system. The real issue is to sort out which functions are best coordinated centrally or best coordinated decentrally and by whom, given that all the existing postsecondary institutions have provided aspects of all the functions in question.

Systems Approach

General systems thinking distinguishes between "open" and "closed" systems. A system is open if some exchange takes place between the organism and the environment. If it is closed, no such exchange takes place.

In the educational context, an open system is one which facilitates human learning by providing access to learning resources that were previously inaccessible. It also concerns itself with the human process of learning. As such, an open system approach to learning must, in a cybernetic sense, deal with its own impact on the environment and the environment of those who want to learn—i.e. the system itself thrives on feedback and feedforward—it becomes a system that learns.

The concept of the "Learning System" as it is emerging in British Columbia reflects both these views. However, unlike the open learning systems approach of the British Open University, this system is a hybrid. It serves as a conceptual framework for a number of traditional and non-traditional institutions to learn to use new technology and explore its impact.

Types of education can be seen on a continuum ranging from the traditional closed environment where students attend classes on a full-time basis in schools, colleges, or universities, through individualized learning on campus, to distance learning. At the other end of the continuum is open learning, where students have ready access to knowledge in which they engage on a part-time basis either at learning centres, at home, or in impromptu groups.

As one moves along the continuum from a traditional closed model to a nontraditional open model of education, the relationship of the learner to the institution and of the learner to the instructor changes. The focus of the student in that environment also changes. Most students who use the nontraditional systems are part-time; course work is only one aspect of their lives. In the conventional campus environment, students are usually full-time. The thrust to provide opportunities to those part-time students has spurred the use of telecommunications. The adaptation of similar approaches in the campus setting is only just beginning.

The notion of the "Learning System" provides a unifying framework for both conventional and nonconventional education methodologies. In its simple form the "Learning System" provides three elements in relationship within a contextual environment—the learner, the source of potential knowledge, and the human interface. New technologies function as connectors and mediums through which interaction among these three elements may be facilitated.

The introduction of new technology alters the roles of educators and learners. Much of the research in open learning systems has been an attempt to identify the human roles in the instructional process. One conclusion is that students have to "learn to learn" and to learn to gain access

to knowledge. The need for a human interface, however, has not diminished. All the indications are that learning is a social phenomenon and that people need contact with other people in order to learn.

There is the potential for the human interface to develop many roles and to change to being a more personal, individual and totally available consultative resource. Thus, the introduction of the technology should create more jobs for educators. It does not usurp the work of the teacher; it does, however, have the potential to transform that role.

The human role involves enthusiasm, guidance, enjoyment, and love of people. The new educator must be well-versed in problem solving, learning to learn, and the effective use of media in the learning process. These humanistic characteristics will be necessary to complement the often impersonal, linear characteristics of the new information processors and the "fear of the unknown" that the idea of computers and satellites present to people. The human interface will be particularly important if a totally mechanistic approach to artificial and natural intelligence is to be avoided.

For educators, this will involve a change of thinking about education and the role of teachers. Change of thinking is the first challenge for the human interface. The new learning systems require self-learning and responsibility, and the role of the human interface is now more crucial than ever before. As more and more information is available in the home, so that more people can be served without the need for campus attendance, the locus of learning will change in importance.

Summary

Although the eventual outcome might not have been predictable, it is arguable that the emergence of the "Learning System" in British Columbia and the development of the Open University Consortium could not have been projected or planned in a more rigorous fashion. It benefited from the experiences of others whose ideas dominated the 1970's, such as the British Open University and Canada's TVOntario, but these were always considered in the context of British Columbia and its geography.

Within this environment the educational approach was focused by the availability of one particular technology, satellite telecommunication. However, environmental change is not necessarily technologically determined. Of greater significance is the way the technology is utilized. The organizing priciple used to define the new relationships, created as a result of the new technology, provides a new model not feasible without the aid of the technology itself.

If we consider the emergence during this time period of other technologies, such as the personal computer (Apple II, 1977–78), computer conferencing (EIES network, 1978), and widespread use of audio-conferencing, we can, with historical hindsight, question the criteria that cause one technology to catalyze widespread change in an educational system and also wonder about the indicators of that change.

It is difficult to prove that the increasing involvement of British Columbia's postsecondary system in distance education is directly linked to the processes and history we have just described. However, if we use as the key indicator, institutional involvement, results do support the "Learning System" model. The opportunity was the availability for experimental use of satellite telecommunication to overcome the barrier of distance in educational delivery. These experiments not only proved the ability of the satellite as a carrier of television signals, in a more important psychological sense, they dissolved the problem of distance. Each community was equidistant as long as it could receive the signal.

This "hands-on" experience by many institutions has begun to significantly alter the perceptions of many educators. Both economics and technology are forcing educators to question conventional notions of teaching in the process *vis-a-vis* new information technologies. We are beginning to understand that "learning" is the real issue for all of us and that the new technologies represent opportunities to increase the potential for learning. However, the driving idea is learning, not technology.

MERCER COUNTY COMMUNITY COLLEGE

MULTI-MEDIA:
The College of the Air At Mercer County Community College

by George Schwartz

The Telecommunications Division of Mercer County Community College has the largest multi-use, state-of-the-art collegiate telecommunications facility in New Jersey. It is utilized for teaching students in academic degree programs and for providing a wide range of educational, informational, and cultural services in the community.

The Mercer County Community College Cable Television Network is a cable television network, linking all operating cable television systems in Mercer County to the college via two-way microwave or cable interconnections. Supported by provisions in each of the municipal cable television ordinances, Mercer operates (on an exclusive, full-time basis) cable channel 23 on every system. Thus, all 55,000 subscribers in the communities of Trenton, Princeton, Lawrence, Ewing, East Windsor, West Windsor, Hightstown, Hopewell Borough, Hamilton, and Pennington have access to the channel as part of their basic cable service.

WWFM, a Corporation for Public Broadcating station, is licensed to Mercer County Community College and is the only public radio station serving Mercer County and central New Jersey. The station is programmed to promote, complement, and give substance to the college's mission of

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providing high quality educational and cultural programs and services for a broad and heterogeneous population. Programming includes classical music (previously unavailable on radio in the central New Jersey community), jazz music, and public affairs programs. Arbitron Rating Company ratings for Spring 1985 indicate that WWFM is number 21 of more than 200 qualified CPB stations in terms of the metro cume rating (8.4%). This unusually high penetration of the Mercer County market ranks WWFM above both Philadelphia and New York City public radio stations.

Satellite communication is made possible through the recent addition of a five-meter, receive-only satellite earth terminal. Located in the interior quadrangle area of the college, the terminal is used for telecommunications technology instruction, teleconferences, and satellite reception of programming for the college's cable television network. Teleconferences are transmitted to a modern Teleconference and Multi-Media Center, a room equipped with a television projection system, individually controlled overhead speakers, and conference-style tables and cushioned arm chairs providing seating for 70 participants.

Production Facilities

Mercer also has fully equipped radio and television studios and control rooms used for the instruction of students enrolled in radio and television production courses, as well as for the production of educational and informational programs. The facilities are state-of-the-art, including a 40-by-50-foot television studio, five color television cameras, Apex 4000H2 switcher, 48 input audio console, character generator, Telescript, solid state lighting system, complete 1/2 inch and 3/4 inch field production and editing services, and six fully equipped radio and audio studios.

The Cable Television and Distribution Center is the control room for a closed-circuit television system that permits the transmission of instructional film/videotape programs to classrooms throughout the campus. The Center also disburses a wide range of audiovisual equipment and houses a library of more than 1,000 videotaped programs and 850 16mm files.

Academic Programs

Mercer's Telecommunications Division offers academic programs. The Telecommunications Technology A.A.S. curriculum provides students with the theory and practical experience necessary for employment as technicians in radio stations, television stations, or cable television systems. Students work with the latest radio, television, and cable television elec-

tronic equipment, including the equipment described in this article. This is the only program of its kind in New Jersey. Successful graduates are able to design and lay out plans for broadcast and cable television facilities, maintain microwave and satellite systems, and demonstrate a working knowledge of digital technology and applications, including microprocessors.

The Radio-Television A.A.A. curriculum offers options in radio, television production, electronic broadcast journalism, and broadcast and cable sales. Students in this program, like the students in the Telecommunications Technology program, are able to experience a practical, hands-on approach to telecommunications.

The Telecommunications Option of the Liberal Arts and Sciences A.A. program is designed to prepare students to transfer into the junior year of a baccalaureate degree program.

College of the Air

Mercer County Community College offers on-and off-students regular college credit courses, using electronic methods of distribution, such as radio, television, and cable television. College of the Air makes it possible for the busy or homebound student to take a course or work toward completing an entire degree program through a combination of classroom and College of the Air courses.

College of the Air provides an unusual opportunity for career preparation, self-improvement, and broadening of cultural and personal interests. The courses are college credit courses fully equivalent to on-campus courses in the content covered and taught by members of the Mercer County Community College faculty. Each course consists of weekly television or radio lessons, textbook and study guide readings, tests and examinations, and interaction with the course instructor. Throughout the semester, telephone consultation with instructors is available. Textbooks and study guides can be purchased at the college store or by mail through a special mail order form supplied with the first mailing of materials by the instructor.

Students are encouraged to matriculate as soon as possible to take advantage of available counseling to ensure the best selection of courses to fit career and transfer goals. While a complete associate degree can not, as yet, be earned exclusively through College of the Air courses, a sufficient variety of radio and television courses is available to provide the beginning courses required or recommended for most associate degree programs. Each semester, a complete schedule of course offerings and times is

MERCER COUNTY COMMUNITY COLLEGE

available.

College of the Air radio courses are offered on WWFM. Television courses are programmed on area public television stations and the Mercer County Community College Cable Television Network (cable channel 23).

Mercer County Community College, producer of such telecourses as "Contemporary Society" and "Fitness for Living," is justifiably proud of its College of the Air, the most successful program of its kind in New Jersey, annually enrolling approximately 1,000 students.

INSTRUCTIONAL TELECOMMUNICATIONS CONSORTIUM (ITC)

DELEGATES

American Association of Community and Junior Colleges

Amarillo College

Austin Community College

Bay Area Community College Television Consortium

Bunker Hill Community College

Catonsville Community College

Coastline Community College

Dallas County Community College District

De Anza Community College

Eastern Educational Consortium

Educational Teleconsortium of Michigan

Florida Community College TV Consortium/Florida

Higher Education Telecommunications Association of Oklahoma (HETA)

John Wiley and Sons, Inc.

Kendall-Hunt Publishing Company

Kirkwood Community College

Knowledge Network

Maricopa County Community College District

Maryland College of the Air

Maui Community College

Mercer County Community College

Miami-Dade Community College District

Montgomery College

North Carolina Department of Community Colleges

North Island College

Northern California Telecommunications Consortium

Northern Illinois Learning Resources Cooperative

Saddleback Community College

Southern California Consortium for Community College TV

Tarrant County Community College District

TVOntario

Vista College

Wisconsin Board of Vocational, Technical and Adult Education

Navarro College

Metropolitan Community College

Frank Phillips College

North Shore Community College

INDIVIDUAL MEMBERS

Wilkes Community College

North Central Technical Institute

Western Technical Community College Area

Toles Learning Center, New Mexico Military Institute

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Associate Degree Preferred. Edited by Dale Parnell, 1985. $15.

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International Trade Education: Issues and Programs. Edited by James R. Mahoney and Clyde Sakamoto, 1985. $10.

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